

Executive Summary for the Draft

Environmental Impact Report and Environmental Impact Statement



DELTA WETLANDS Project

Prepared for:



State Water Resources
Control Board
Division of Water Rights

and



U. S. Army Corps of
Engineers
Sacramento District

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September 1995

**Executive Summary of the Draft Environmental
Impact Report and Environmental Impact
Statement for the Delta Wetlands Project**

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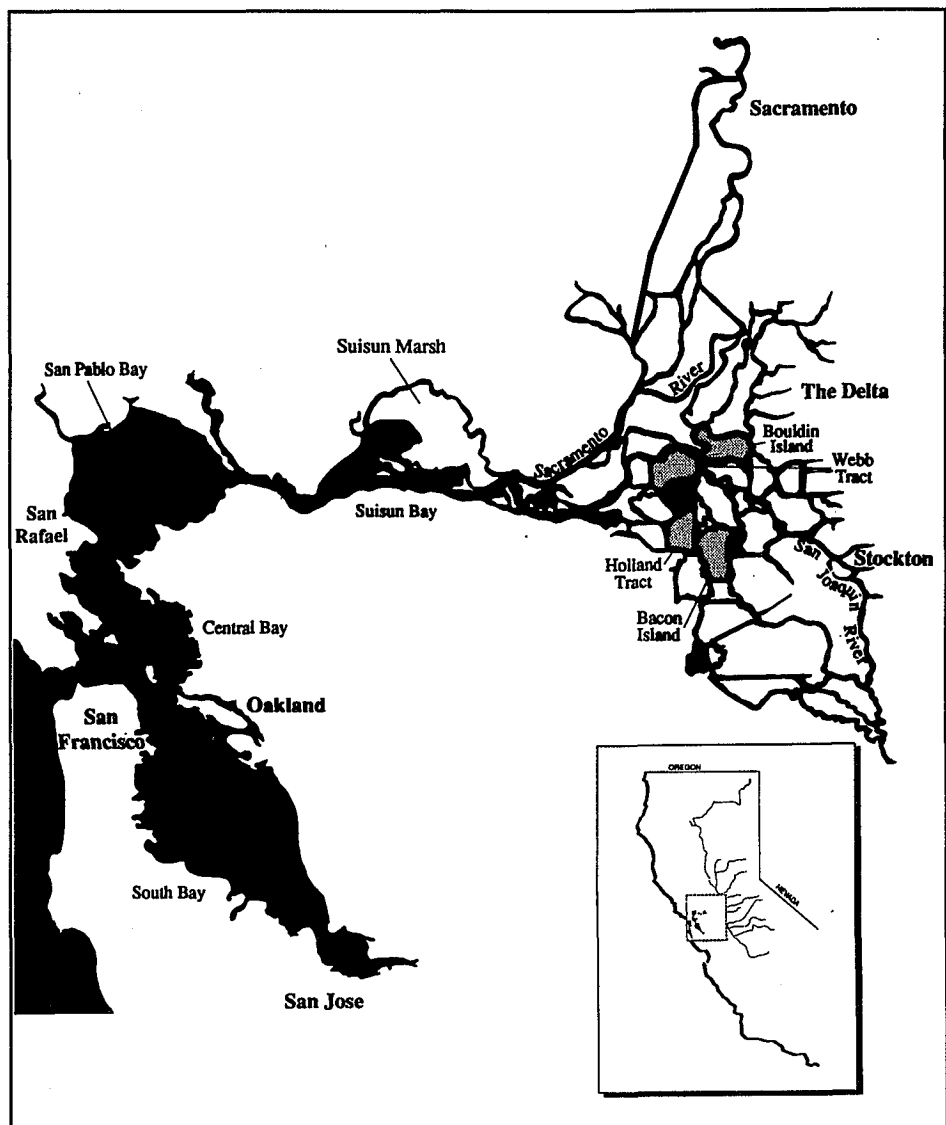
INTRODUCTION

Delta Wetlands Properties (DW) proposes a water storage project on four islands in the Sacramento-San Joaquin Delta (Delta). The project would involve diverting and storing water on two of the islands (Bacon Island and Webb Tract, or "reservoir islands") and seasonally diverting water to create and enhance wetlands and to manage wildlife habitat on the other two islands (Bouldin Island and Holland Tract, or "habitat islands"). DW proposes constructing recreation facilities along the perimeter levees on all four DW project islands; operating a private airstrip on Bouldin Island; and, during periods of nonstorage, managing shallow water, which may provide wetland habitat values on the reservoir islands. The DW project islands are owned either wholly or partially by DW. To operate its project, DW would improve and strengthen levees on all four islands and install additional siphons and water pumps on the perimeters of the reservoir islands. DW would operate the habitat islands primarily to support wetlands and wildlife habitat.

The purpose of the DW project is to divert surplus Delta inflows, transferred water, or banked water for later sale and/or release for Delta export or to meet water quality or flow requirements for the San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta) estuary. Additionally, the DW project will provide managed wetlands and wildlife habitat areas and recreational uses.

California's Bay-Delta Estuary

The Delta is part of an interconnected system that includes Suisun Marsh, San Francisco Bay, and the Sacramento and San Joaquin Rivers. The Bay/Delta estuary is one of the most important and complex estuaries on the Pacific Coast, providing important aquatic and terrestrial habitat for fish, waterfowl, and other wildlife. Water that flows through the Delta supplies a portion of the domestic water for more than two-thirds of the state's population and irrigates several million acres of farmland.



Opportunities for Public Involvement

The public and interested agencies are encouraged to submit comments on the draft EIR/EIS for the DW project during the 60-day public review period. Federal, state, and local agencies have received copies of the draft EIR/EIS, as have interested individuals and groups. Copies of the draft EIR/EIS are also available for review at selected libraries in Contra Costa, San Joaquin, and Sacramento Counties.

SWRCB and the Corps, the joint lead agencies for the document, will conduct public hearings to accept oral comments on the adequacy of the draft EIR/EIS during the 60-day public review period.

All oral and written comments received during the review period will be considered and responded to in the final EIR/EIS.

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EIR/EIS PROCESS

The California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) require environmental analyses for local, state, and federal permitting processes. DW has applied to the California State Water Resources Control Board (SWRCB), Division of Water Rights, for the necessary permits to divert water and store it on the DW project islands. DW also has applied to the U.S. Army Corps of Engineers (Corps) for a permit under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899 to discharge dredged or fill material into waters of the United States and for other project activities in navigable waters.

Because of DW's applications to SWRCB and the Corps, SWRCB is deemed the lead agency under CEQA and the Corps is deemed the lead agency under NEPA. A joint draft environmental impact report/environmental impact statement (EIR/EIS) has been prepared under the direction of the lead agencies to comply with the regulatory requirements of both CEQA and NEPA.

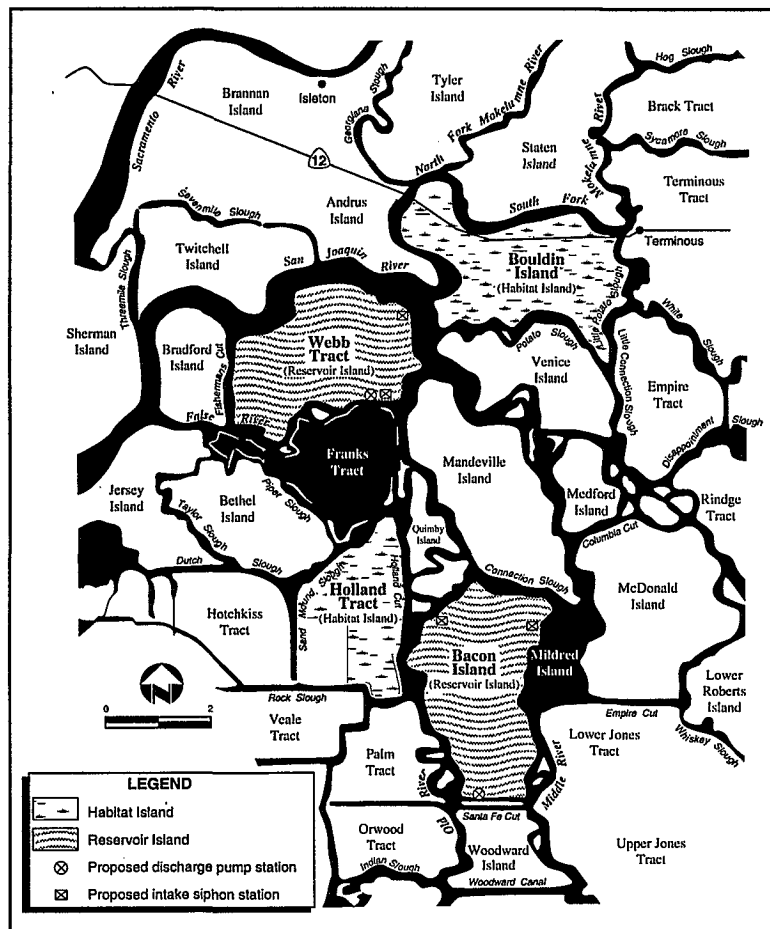
The purposes of the EIR/EIS are to analyze the environmental effects of DW's project, to identify ways to reduce or avoid potential adverse environmental impacts resulting from the project, and to identify and assess alternatives to the proposed action.

OVERVIEW OF PROPOSED PROJECT OPERATIONS

The DW project would increase the availability of high-quality water in the Delta for export or outflow by storing water on two reservoir islands, and would compensate for wetland and wildlife effects of the water storage operations on the reservoir islands by implementing a habitat management plan (HMP) on two habitat islands. As an incidental operation of the habitat islands, water released may be sold or used for the same purposes as the water released from the reservoir islands.

DW now has riparian rights and senior appropriative rights for direct diversion and is applying to SWRCB for additional appropriative rights for direct diversion and diversion to storage.

The DW project also includes construction of recreation facilities along the perimeter levees on all four DW project islands; operation of a private airstrip on Bouldin Island; and, during periods of nonstorage, management of shallow water within an inner levee system on the reservoir islands.



Water Right and Permit Application Process

Water Right Applications

DW has applied for water right permits for direct diversion or diversion to storage of surplus Delta inflows and discharge of water from the reservoir islands to Delta channels to meet Bay-Delta estuary water quality or flow requirements, or redirection of water from the Delta for export. SWRCB's decision on DW's water right applications will therefore address the availability of water for direct diversion, diversion to storage, discharge of water into the Delta, export of stored water, and management of the habitat islands to compensate for effects of water storage on wetlands and wildlife habitat. The EIR/EIS describes the analysis of the effects of the diversion of water onto the DW project islands and redirection of water for export at the Delta export pumps and discusses the relationship of such diversions and pumping to applicable federal and state restrictions.

Department of the Army Permit Application Process

Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into waters of the United States, including wetlands, unless a permit is obtained from the Corps. Section 10 of the Rivers and Harbors Act of 1899 prohibits work on, over, or under navigable waters of the United States without a permit from the Corps. DW is required to obtain a permit from the Corps under Section 404 for DW project fill activities associated with perimeter and interior levee work on the reservoir islands; habitat enhancement activities on the habitat islands; and construction of boat docks, pumps, and siphons in Delta channels. As part of compliance with the Clean Water Act, Section 401 requires SWRCB certification that the proposed discharge complies with state water quality standards.

Comparison of the DW Project Alternatives

	Alternative 1: Two reservoir islands and two habitat islands	Alternative 2: Two reservoir islands and two habitat islands	Alternative 3: Four reservoir islands with limited habitat on Bouldin Island
Reservoir storage capacity (TAF) ^a	Bacon Island: 118 Webb Tract: 120 Total: 238	Bacon Island: 118 Webb Tract: 120 Total: 238	Bacon Island: 117 Webb Tract: 119 Bouldin Island: 98 Holland Tract: 72 Total: 404
Mean annual diversion (TAF) ^{b,c}	222	225	356
Mean annual discharge (TAF) ^{b,c}	188	202	302
Water operation facilities	Additional siphons and water pumps would be installed on the reservoir islands. Fish screens would be installed on new and existing siphons on the reservoir and habitat islands.	Same as for Alternative 1.	Additional siphons with fish screens and water pumps would be installed on all four reservoir islands.
Levee improvements	DW would raise and widen the perimeter levees on reservoir islands to hold water at a maximum elevation of 6 feet above mean sea level. Levee improvements on all four DW project islands would be designed to meet or exceed recommended standards for levees outlined by California Department of Water Resources (DWR).	Same as for Alternative 1.	The exterior levees of all four reservoir islands would be improved as described for the reservoir islands under Alternatives 1 and 2. Implementation of Alternative 3 also would require construction of a large interior levee, known as Wilkerson Dam, across Bouldin Island along the southern side of State Route 12.
Wetlands management	Wetlands and wildlife habitat would be created and managed year round on Bouldin Island and Holland Tract under an HMP to offset the effects of water storage operations on wetlands and wildlife habitat. An inner levee system would be constructed on the reservoir islands to manage shallow water. Incidental to water storage operations, the inner levee system may enhance forage and cover for wintering waterfowl when water would not be stored on the reservoir islands.	Same as for Alternative 1.	The portion of Bouldin Island north of SR 12 would be a year-round habitat area. The North Bouldin Habitat Area would be managed for riparian and wetland habitat. An inner levee system would be constructed on the reservoir islands to manage shallow water. Incidental to water storage operations, the inner levee system may enhance forage and cover for wintering waterfowl when water would not be stored on the reservoir islands. To offset the effects of water storage operations, additional offsite wildlife habitat compensation would be required for this alternative.
Maximum number of recreation facilities ^d	Bacon Island: 11 Webb Tract: 11 Bouldin Island: 10 Holland Tract: 6	Same as for Alternative 1.	Bacon Island: 11 Webb Tract: 11 Bouldin Island: 10 Holland Tract: 8

Notes: TAF = thousand acre-feet.

a. Assuming a maximum pool elevation of 6 feet above mean sea level (based on National Geodetic Vertical Datum data).

b. An incidental operation of the habitat islands may involve the sale or use of approximately 19 TAF of water discharged from the islands according to the HMP. Water would be discharged from the habitat islands based on wetland and wildlife management needs. The sale or use of this water would be for the same purposes as the sale or use of the water discharged from the reservoir islands but is not included in these figures.

c. Mean annual diversion and discharge values for reservoir islands are derived from simulations of DW project operations based on the historical hydrologic record for 1922-1991 and assuming current Delta standards, facilities, and upstream and export demands for water.

d. Each recreation facility would be constructed on approximately 5 acres along a perimeter levee and would include vehicle and boat access.

ALTERNATIVES EVALUATED IN THE EIR/EIS

The DW project alternatives (Alternatives 1, 2, and 3) and the No-Project Alternative were selected to represent a range of project operations for purposes of determining environmental impacts. All alternatives are designed to operate within the objectives of SWRCB's 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (1995 WQCP), adopted May 22, 1995. If the DW project is approved by the lead agencies, actual project operations should be within the range of impacts analyzed in the EIR/EIS.

The operational scenarios presented below as Alternatives 1 and 2 both represent DW's proposed project and differ only with regard to operating criteria for discharge of stored water. Analysis of the proposed project as represented by these two alternatives allows potential impacts of DW's proposed project to be evaluated for the full range of likely DW operations. An additional operational scenario, Alternative 3, consists of use of all four of the DW project islands as reservoirs and provision of limited compensation habitat on Bouldin Island. The "seasonal wetlands" operation of diverting and storing water for discharge to export during winter through summer and creating wetland habitat in fall, as originally proposed in the 1990 EIR/EIS, no longer applies to any of the alternatives.

ALTERNATIVES 1 AND 2

General Overview

Alternatives 1 and 2 entail the potential year-round diversion and storage of water on two Delta islands owned by DW (Bacon Island and Webb Tract) and wetland and wildlife habitat creation and management, with the incidental sale of the water used for wetland and wildlife habitat creation, on two Delta islands owned primarily by DW (Bouldin Island and Holland Tract). All of the land required for the DW project is currently owned by DW or controlled under an option agreement. The reservoir island operations may include shallow-water management during periods of nonstorage at the discretion of DW and incidental to the proposed project. To operate Alternative 1 or 2, DW would improve levees on the perimeters of the reservoir islands and install additional siphons and water pumps. Inner levee systems would also be constructed on both the reservoir and habitat islands for shallow-water management.

Under Alternative 1 or 2, during periods of availability throughout the year, water would be diverted onto the reservoir islands to be stored for later sale or release. Water would be discharged from the islands into Delta channels for sale for

Delta Wetlands Environmental Research Fund

The DW project, once operating, would contribute \$2 per acre-foot of water sold for Delta export to a research fund established to sponsor related research work. No monies from the fund will be allocated to fulfill project permit requirements. Rather, it is intended that the fund pay for research in those areas that may be affected by the DW project and in other areas in the Delta. The fund would be administered by DW and an invited committee established to decide how research funds would be allocated. The committee will likely include representatives from the California Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), SWRCB, DW, fishery-oriented and waterfowl-oriented organizations, and one general environmental organization.

beneficial uses for export or for Bay-Delta estuary needs during periods of demand throughout the year, subject to state and federal regulatory standards, endangered species protection measures, and Delta export pumping capacities. Water discharged into the Delta channels under proposed project operations would mix with Delta inflows from the Sacramento and San Joaquin Rivers and other tributary rivers and would be available as either export water or Delta outflow (e.g., outflow necessary to satisfy 1995 WQCP objectives or other state or federal standards). DW project operations can be adjusted on a daily basis according to hydrologic information and information on fish abundance and location obtained through monitoring.

The DW project islands could also be used for interim storage of water being transferred through the Delta from sellers upstream to buyers served by Delta exports or to meet Bay-Delta estuary outflow requirements (water transfers) or for interim storage of water owned by parties other than DW for use to meet scheduled Bay-Delta estuary outflow requirements or for export (water banking). Such uses could occur only after the transferrers or bankers of the water applied to SWRCB for rights to new points of diversion or redirection onto the DW project islands. The frequency and magnitude of these transfer/banking activities is uncertain at this time; each would require separate authorization and may require further environmental documentation beyond that provided for the DW project.

During periods of nonstorage, DW could choose to divert water onto the reservoir islands under riparian claim or senior appropriative water rights for wetland habitat management; typically, diversion would begin after September 1, after an appropriate dry period to allow for growth of wetland plants of value to wintering waterfowl as forage and cover. Wetland habitat created on the reservoir islands would be flooded as storage water becomes available. The inner levee system constructed on each reservoir island would manage shallow-water circulation during nonstorage periods.

Water would be diverted onto the habitat islands to be used for wetland and wildlife habitat creation and management during periods of availability and need. Most likely, the water diversions for wetland management would begin in September and water would be circulated throughout winter. Except for small areas of permanent water, water used on the habitat islands would be discharged on a schedule related to wetland and wildlife values, with drawdown typically by May. As an incidental operation, the water released at this time from the habitat islands may be sold or used for the same purposes as water released from the reservoir islands.

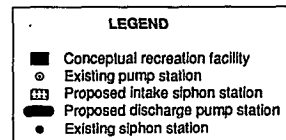
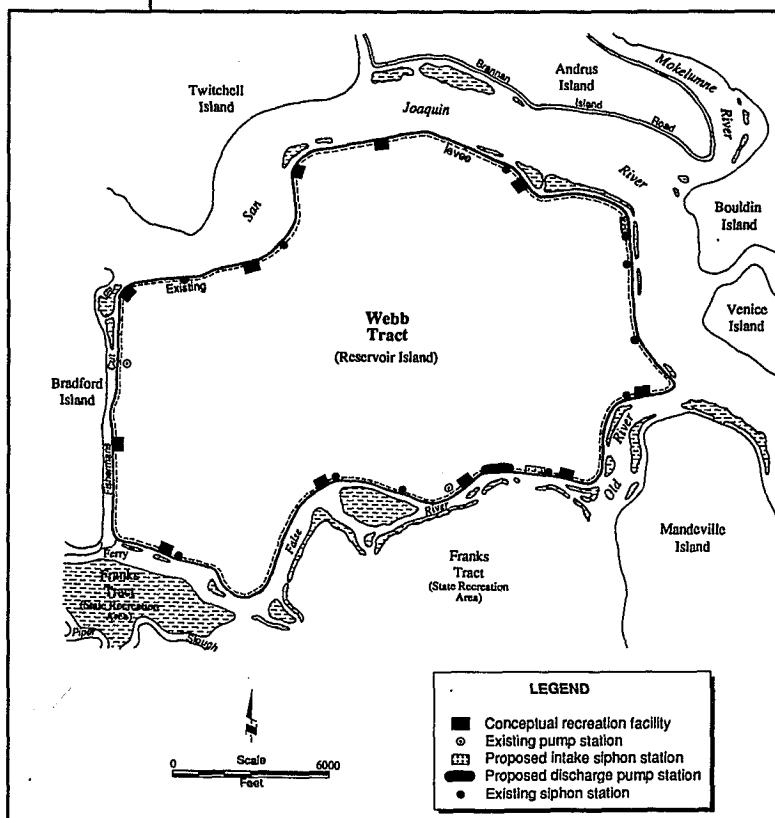
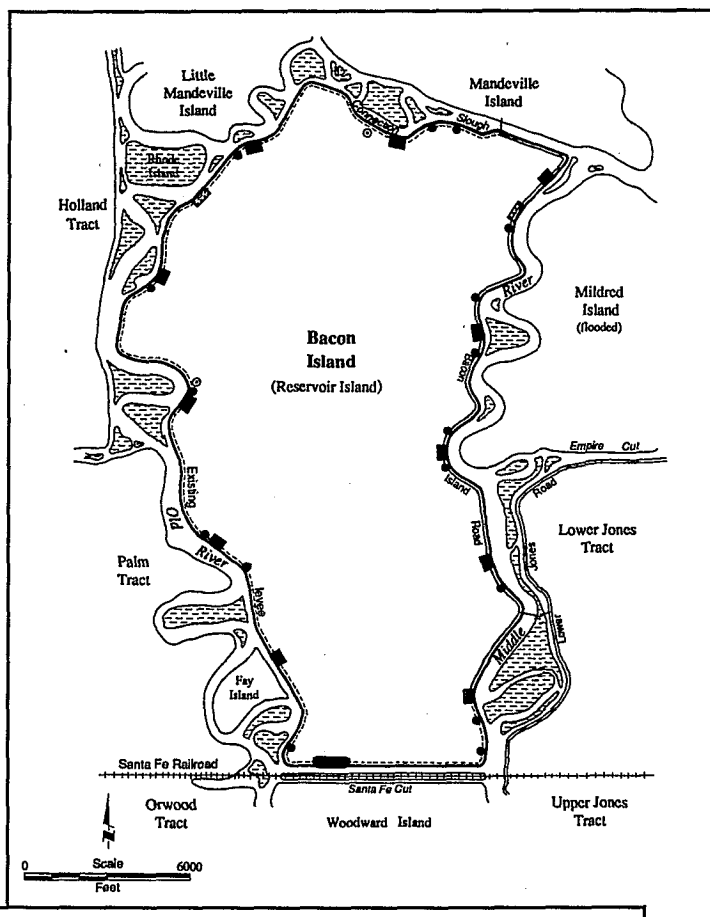
Portions of the habitat islands and the reservoir islands would support recreational activities. Waterfowl hunting would be allowed on all four DW project islands; upland bird hunting would be allowed on the reservoir islands and in specific areas on the habitat islands. Private recreation facilities, including as many as 30 boat berths per facility in adjacent Delta channels and 36 boat berths per facility on the interior of the islands,

vehicle access and parking, and living accommodations, would be located along the perimeter levees on all four DW islands. There may be as many as 38 private recreation facilities on the four islands developed over the life of the project and each facility may accommodate up to 40 bedrooms. The recreation facilities on all four islands may be operated to support year-round use of the boat docks. Recreational use and location of the recreation facilities on the habitat islands would be subject to restrictions of the HMP; recreational use on the reservoir islands would depend on water storage operations.

The DW project would also establish an environmental research fund to sponsor research on resources that may be affected by the DW project or in other areas of the Delta.

Reservoir Islands

Bacon Island and Webb Tract would be managed for water storage under Alternatives 1 and 2. Facilities that would be needed for the proposed water storage operations include intake siphon stations with auxiliary pumps to divert water onto the reservoir islands and pump stations to discharge stored water from the islands. DW proposes to construct two intake siphon stations on each reservoir island with 16 new siphons each, for a total of 64 siphons. One discharge pump station with 32 new pumps would be installed on Webb Tract and a pump station with 40 pumps would be installed on Bacon Island, for a total of 72 new pumps. Where possible, existing siphons and pumps would be modified or upgraded (e.g., by installation of fish screens on siphons) and reused for water operations. DW has proposed locations for these facilities; flexibility exists to choose other locations for the siphon and pump stations before initial construction if, at the end of the CEQA/ NEPA process, the lead agencies determine that different locations are desirable because of channel hydraulics or environmental, water quality, or other considerations.



Definition of Terms

Following are definitions of several terms used to describe the manner in which the project alternatives would operate relative to 1995 WQCP requirements and other conditions:

Export limits. The 1995 WQCP specifies that Delta exports are limited to a percent age of total Delta inflow (generally 35% during February-June and 65% during July-January).

Outflow requirements. The 1995 WQCP specifies Delta outflow requirements that encompass water quality protection for agricultural and municipal and industrial uses, Suisun Marsh, and fish habitat. In standard DWR calculations of Delta operations (using the model known as "DWRSIM"), "outflow" represents the difference between inflow and exports; the outflow term used here therefore includes in-Delta consumptive use.

Available water. Under the 1995 WQCP, available water is total Delta inflow less Delta outflow requirements.

Allowable export. Water allowable for export under the 1995 WQCP is the lesser of the amount specified by the export limits (i.e., percentage of total Delta inflow) and the amount remaining after outflow requirements are met (i.e., available water).

Physical export pumping capacity. The State Water Project (SWP) export pumps have a maximum physical pumping capacity of 10,300 cubic feet per second (cfs) and the Central Valley Project (CVP) export pumps have a maximum physical pumping capacity of 4,600 cfs, for a combined physical export pumping capacity of 14,900 cfs. At times, the canal capacity for the CVP is reduced to 4,200 cfs, reducing the combined physical export pumping capacity to 14,500 cfs.

Permitted pumping rate. The Corps does not require a permit under Section 404 of the Clean Water Act for current SWP export pumping. However, the Corps would require a permit if SWP export pumping were to exceed a maximum 3-day average rate of 6,680 cfs. Therefore, the maximum combined export pumping rate that does not require a Corps permit is 11,280 cfs (6,680 cfs for the SWP pumps and 4,600 cfs for the CVP pumps). The restrictions for the period of December 15 to March 15, as interpreted by DWR, allow a combined maximum 3-day average rate of 11,700 cfs in December and March and a combined rate of 12,700 cfs in January and February. For assessment of the DW project alternatives, it is assumed that the SWP and CVP pumps will always pump the maximum amount allowable (i.e., the lesser of available water and the amount specified by the export limits) within the limits of the permitted pumping rate.

Future permitted export pumping capacity. In the future, new permit conditions may be established for the SWP, thereby allowing the permitted export pumping rate of the SWP pumps to be increased to the physical export pumping capacity of 10,300 cfs. If that occurs, the combined permitted export pumping rate of the SWP and CVP pumps would then equal 14,900 cfs or 14,500 cfs.

Actual exports. Actual exports are the least of the following: the amount specified by the export limits (i.e., as percentage of inflow), available water (i.e., water available after outflow requirements are met), and permitted export pumping rate.

DW discharge for export. DW may sell its stored and discharged water to buyers south or west of the Delta who would arrange to have the purchased water transported to areas of use through either the SWP or CVP aqueducts. The term "wheeling" is often applied to this process of transporting water owned by the purchasing entity through the SWP or CVP aqueducts.

Water Storage Operations

Storage Capacity.

The reservoir islands would be designed for water storage levels up to a maximum pool elevation of +6 feet relative to mean sea level (based on National Geodetic Vertical Datum data) providing a total estimated initial capacity of 238 thousand acre-feet (TAF), allocated between Bacon Island and Webb Tract as 118 TAF and 120 TAF, respectively. Water availability, permit conditions, and requirements of the California Department of Water Resources (DWR) Division of Safety of Dams (DSOD) may limit storage capacities and may result in a final storage elevation of less than +6 feet.

The total physical storage capacity of the reservoir islands may increase over the life of the project as a result of soil subsidence (local or regional sinking, mainly resulting from the oxidation of peat soil in the Delta). Subsidence on the reservoir islands is currently estimated to average 2-3 inches per year and is thought to be caused mostly by agricultural operations. With water storage operations replacing agricultural operations, the rate of subsidence on the reservoir islands is expected to be greatly reduced, although some subsidence may still occur. No method currently exists to predict the rate of subsidence on a Delta island used for water storage operations. DW estimates, however, that the reservoir islands could subside at a rate of approximately 0.5 inch per year, even with the cessation of agricultural operations and possible sedimentation during filling and storage. Under this hypothetical scenario for subsidence on the reservoir islands, the storage capacity of the reservoir islands could increase by as much as 9% in 50 years, increasing total storage capacity of the reservoir islands to 260 TAF.

Siphon Station Design.

Two new siphon stations for water diversions would be installed along the perimeter of each reservoir island. Each siphon station would consist of 16 siphon pipes 36 inches in diameter. Fish screens to prevent entrainment of fish in DW diversions would be installed around the intake end of each existing and new siphon pipe. The individual siphons would be placed as close together as possible but would be spaced at least 40 feet apart to incorporate fish screen requirements. DW could use the existing reservoir island siphons for diversions to create shallow-water wetland habitat. In-line booster pumps would be available on the reservoir islands to supplement the siphon capacity during final stages of reservoir filling.

Pump Station Design.

One discharge pump station would be located on each reservoir island. The pump stations would have 32 new pumps (on Webb Tract) or 40 new pumps (on Bacon Island) with 36-inch-diameter pipes discharging to adjacent Delta channels. Typical spacing for the pumps would be 25 feet on center. An assortment of axial-flow and mixed-flow pumps would be used to accommodate a variety of head conditions throughout drawdown. Actual rates

of discharge of each pump would vary with the remaining pool elevations. As water levels decrease on the islands, the discharge rate of each pump also would decrease. Existing pump stations on the islands may be modified and used when appropriate to help with dewatering or for water circulation for water quality purposes.

Diversion and Discharge Operations.

The DW project alternatives are designed to operate within the objectives of the 1995 WQCP and consistently with Corps requirements for maximum State Water Project (SWP) exports. The following discussions explain the criteria for diversions under Alternatives 1 and 2; describe the assumed operating criteria for discharges under Alternative 1; and describe the assumed criteria for discharges under Alternative 2, contrasting them with those for Alternative 1.

Diversions under Alternatives 1 and 2.

Under Alternatives 1 and 2, DW diversions are treated consistently with the 1995 WQCP objectives for Delta exports at the SWP and Central Valley Project (CVP) pumping plants. That is, DW diversions are considered to be the same as SWP and CVP exports in complying with the WQCP objectives, although DW's applied-for water rights for diversions would have a lower priority than the senior SWP and CVP water rights.

DW direct diversions or diversions to storage could occur in any month, but would occur only when the volume of allowable water for export (i.e., the lesser of the amount specified by the export limits and the amount of available water) is greater than the permitted pumping rate of the export pumps. This would occur when two conditions are met: 1) when all Delta outflow requirements are met and 2) when the export limit is greater than the permitted pumping rate, so that water that is allowable for export is not being exported by the SWP and CVP pumps. Situations may exist, however, in which the SWP and CVP may not be pumping at capacity because of low demands during winter, maintenance activities, or other circumstances, but DW would still be able to divert water for storage.

Discharges under Alternative 1.

For Alternative 1, the EIR/EIS analysis assumes that discharges of water from the DW islands would be exported in any month when unused capacity within the permitted pumping rate exists at the SWP and CVP pumps and strict interpretation of the export limits (percentage of total Delta inflow, or "percent inflow") specified in the 1995 WQCP does not prevent use of that capacity. Such unused capacity could exist when the amount of available water (i.e., total inflow less Delta outflow requirements) is less than the amount specified by the export limits.

Under this alternative, DW discharges would be treated as additions to total Delta inflow. Export of DW discharges thus would be limited to the lesser of the permitted export pumping capacity and the amount calculated under the "percent inflow" export limit, based on the adjusted inflow amount. Under Alternative 1, DW has two choices regarding allocation of discharges. If DW chooses to discharge at the maximum DW discharge rate, some of the releases must be used to increase Delta outflow while the balance is exported. Alternatively, DW could choose to limit discharges so that no allocation to Delta outflow is needed.

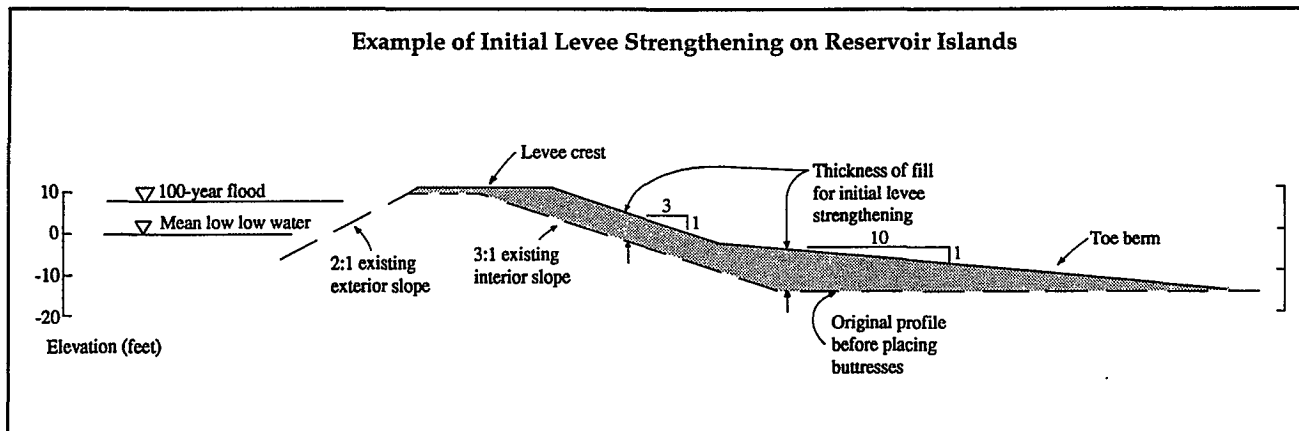
Discharges under Alternative 2.

Under Alternative 2, it is assumed that releases of water from the DW islands would be exported by the SWP and CVP pumps during any month when unused capacity within the permitted pumping rate exists at the SWP and CVP pumps. DW discharges would be allowed to be exported in any month when such capacity exists and would not be subject to strict interpretation of the export limits (percentage of total Delta inflow). It is assumed that Alternative 2, like Alternative 1, would operate in the context of current Delta facilities, demand for export, and operating constraints. Under this alternative, it is assumed that export of DW discharges is limited by the 1995 WQCP Delta outflow requirements and the permitted combined pumping rate of the export pumps but is not subject to strict interpretation of the 1995 WQCP "percent of inflow" export limit.

Timing and Rate of Diversions onto the Reservoir Islands.

The timing and volume of diversions onto the reservoir islands would depend on how much water flowing through the Delta is not put to reasonable beneficial use by senior water right holders or required for environmental protection and would be subject to operational terms and conditions of project approval. DW proposes to develop a procedure to coordinate DW project diversions with SWP and CVP operations on a daily basis to ensure that DW diversions capture only available Delta flows, satisfy 1995 WQCP water quality objectives, and maximize efficiency of the DW water storage operations.

Diversion rates of water onto the reservoir islands would vary with pool elevation and water availability. The maximum rate of diversions onto either Webb Tract or Bacon Island would be 4,500 cubic feet per second (cfs) (9 TAF per day) at the time diversions begin (i.e., when head differential [the pressure created by water within a given volume] between channel water elevation and the island bottom is greatest). The diversion rate would be reduced as the reservoirs fill and the head differentials diminish. Booster pumps would be used to complete the filling process. The combined maximum daily average rate of diversion for all the islands (including diversions to habitat islands, described below) would not exceed 9,000 cfs. The combined maximum monthly average diversion rate would be 4,000 cfs; at this average rate, both reservoir islands could be filled in approximately one month.



Timing and Rate of Discharges from the Reservoir Islands.

DW proposes to discharge stored water from the reservoir islands during periods of demand in any month, subject to Delta regulatory limitations and export pumping capacities. Discharges would be pumped at a combined maximum daily average rate of 6,000 cfs. The combined monthly average discharge rate of the reservoir islands, however, would not exceed 4,000 cfs; at this average rate, both reservoir islands could be emptied in approximately one month. The pump station pipes would discharge underwater to adjacent Delta channels.

Improvements and Maintenance of Perimeter Levees

For operation of Alternatives 1 and 2, the perimeter levees on the DW reservoir islands would be improved to bear the stresses and erosion potential of interior island water storage and drawdown. DW would raise and widen the perimeter levees on the reservoir islands to hold water at a maximum elevation of +6 feet. Levee improvements would be designed to meet or exceed state-recommended criteria for levees outlined in DWR Bulletin 192-82. Levee design would address control of wind and wave erosion through placement of rock revetment on the inside slopes of the perimeter levees and control of project-related seepage through an extensive monitoring and control system.

DW would implement a monitoring and maintenance plan for the improved perimeter levees on the reservoir islands. During project operation, the perimeter levees would be inspected weekly to indicate any erosion, cracking, or seepage problems. Ongoing maintenance activities on the levees would include, but are not limited to, placement of fill material, placement or installation of erosion protection material, reshaping or grading of fill material, herbicide application, selective burning, and regrading or patching of the levee road surface.

Shallow-Water Management on the Reservoir Islands

Incidental to project operations, Alternatives 1 and 2 could include shallow-water management on Bacon Island and Webb Tract to enhance forage and cover for wintering waterfowl when water would not be stored on the reservoir islands. DW would not be required to create wetland habitat on the reservoir islands to compensate for impacts on wildlife or wetland resources resulting from water storage operations; compensation habitat is provided by the HMP on the habitat islands. Creation of wetland habitat on the reservoir islands would be implemented at DW's discretion.

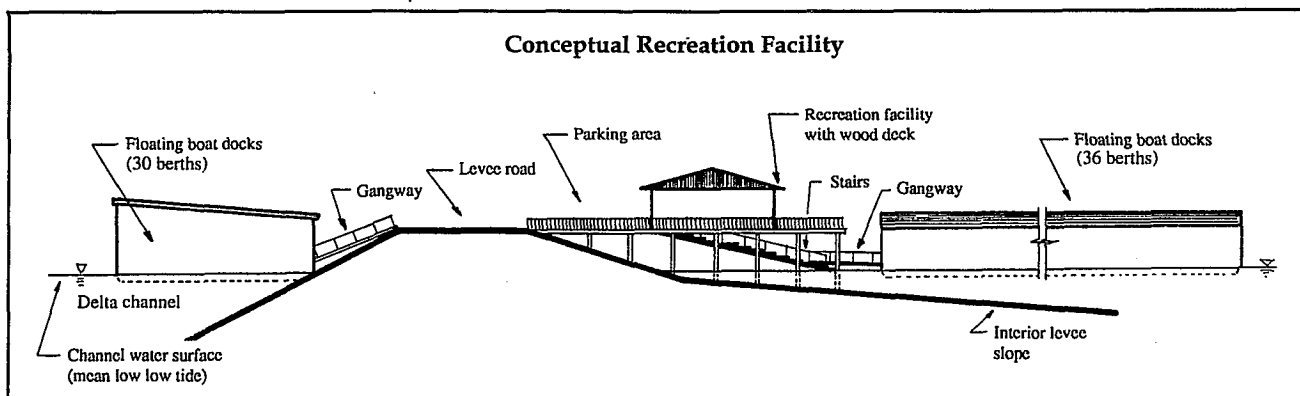
DW would construct and maintain an inner levee system on the bottoms of the reservoir islands. The system would consist of a series of low-height levees and connecting waterways and would manage shallow water during periods of nonstorage. The inner levees would be broad earthen structures similar to the structures currently in place on existing farm fields.

When water is not being stored on the reservoir islands, the islands could be flooded to shallow depths (approximately 1 acre-foot of water per acre of wetland) for creation of wetland habitat, typically 60 days after reservoir drawdown. During years of late reservoir drawdown, additional time may be necessary before shallow flooding begins to allow seed crops to reach maturity. Once shallow flooding for wetland management occurred, water would be circulated through the system of inner levees until deep flooding occurred or through April or May. If the reservoir islands were not deeply flooded by April or May, water in seasonal wetlands would be drawn down in May, and if no water were available for storage, the island bottoms would remain dry until September when the cycle would potentially repeat. Incidental to the shallow-water management, DW could potentially sell that water when it was drawn down in April or May.

Operations and Maintenance

Operation and maintenance activities for the reservoir islands under Alternatives 1 and 2 would include:

- operation of onsite siphons and pumps during water diversions and discharges;
- inspections and maintenance of perimeter levees, including placement of fill and rock revetment as needed;
- maintenance of inner levees for shallow-water management and management of reservoir bottoms;



- maintenance and monitoring of siphon units and fish screens;
- inspections and maintenance of pump and siphon stations; and
- maintenance and operation of recreation facilities.

Other operation and maintenance measures required by water rights or other permits and agreements (including proposed mitigation measures) are described for each resource area in the respective chapters of the EIR/EIS.

Recreation Facilities

Water storage operations on Bacon Island and Webb Tract would not preclude recreation on those islands. DW proposes to construct a maximum of 11 recreation facilities on each of these islands along the perimeter levees. Each recreation facility would be constructed on approximately 5 acres and would include living quarters with a maximum of 40 bedrooms, a 30-berth floating dock with a gangway that provides access from neighboring water channels, a 36-berth floating dock on the interior of the island to provide small-boat access to hunting areas, and a 40-car parking lot located along the levee crest access road.

Habitat Islands

Bouldin Island and Holland Tract would be managed for wetlands and wildlife habitat under Alternatives 1 and 2. An incidental operation of the habitat islands may involve the sale or use of water required to be drained from the islands. This water would be sold or used for the same purposes as the water discharged from the reservoir islands.

The primary function of the habitat islands, as described in the HMP, is to offset effects of water storage operations on state-listed threatened and endangered species, waters of the United

States (including wetlands) pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, other wildlife habitat areas, and wintering waterfowl. The habitat islands would be developed and managed to provide breeding and foraging habitat for special-status wildlife species and other important wildlife species groups. The amounts and types of wetlands and other habitats developed on the habitat islands would compensate for the impacts of project facility construction and water storage operations on the reservoir islands and any impacts associated with construction and operation of the habitat islands.

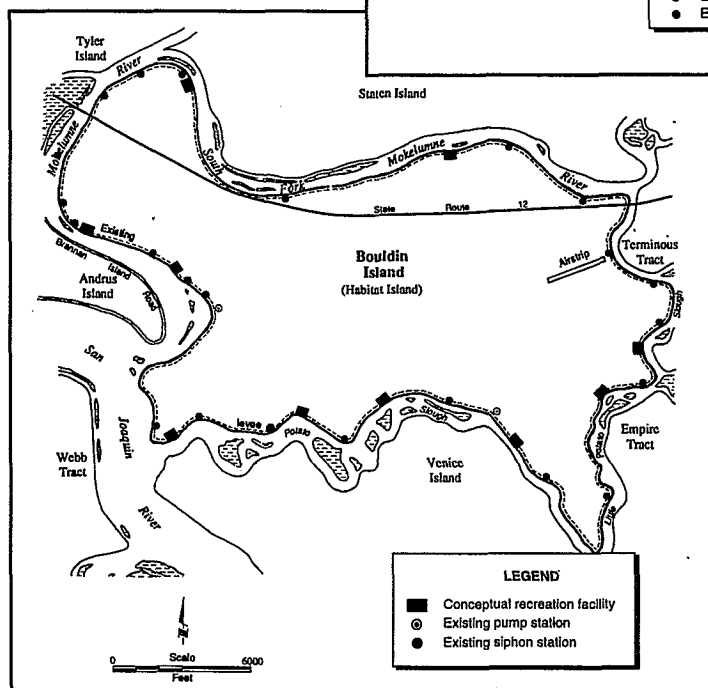
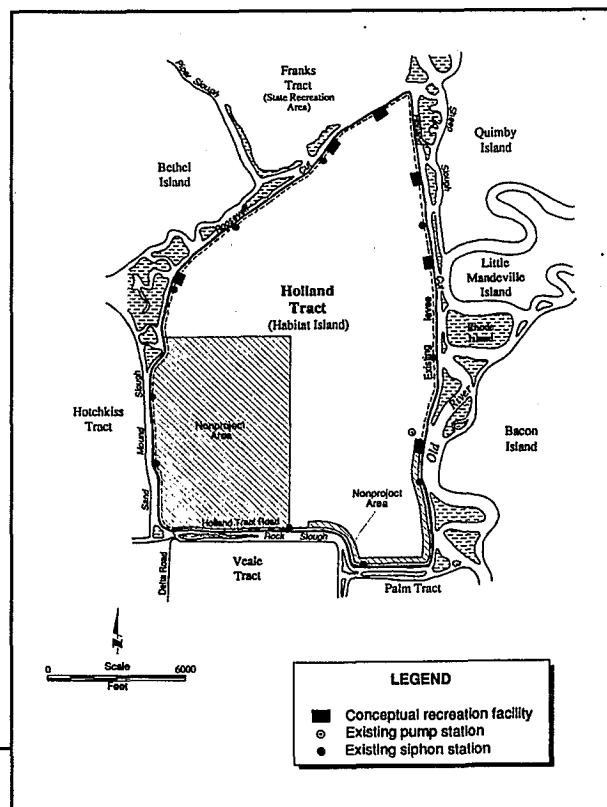
Wetland management on the habitat islands would require grading areas, revegetating, and diverting water. As part of Alternatives 1 and 2, improvements would be made to existing siphon and pump facilities and to perimeter levees, including levee buttressing to meet DWR's recommended standards for levee stability and flood control. No new siphon or discharge pump stations would be constructed on the habitat islands. Recreation facilities would be constructed on the habitat island perimeter levees.

Habitat Island Diversions and Discharges

Bouldin Island and Holland Tract would be managed for improvement and maintenance of wetland and wildlife values. The timing and volumes of diversions onto the habitat islands would depend on the needs of wetlands and wildlife habitat.

Wetland diversions would typically begin in September and water would be circulated through winter. Existing siphons would be used for diversions to the habitat islands. Fish screens would be installed on all siphons used for diversions.

The maximum rate of proposed diversions onto Holland Tract and Bouldin Island would be 200 cfs per island. Diversions onto the habitat islands would not cause the combined maximum daily average diversion rate of 9,000 cfs



Development of the Habitat Management Plan

DW proposes to dedicate approximately 9,000 acres, including Bouldin Island and most of Holland Tract, as wetland and wildlife habitat areas to offset water storage operation effects on wetlands and wildlife habitat. Also incorporated into the HMP are provisions for best land management practices to benefit wildlife species other than those special-status target species specifically addressed by the HMP. The HMP specifically describes wildlife habitat management goals and objectives, habitat design and function, habitat and recreation management guidelines, and monitoring procedures for ensuring the short- and long-term success of project compensation.

The HMP was developed by a team consisting of representatives of California Department of Fish and Game, SWRCB, and Jones & Stokes Associates, in consultation with the Corps and U.S. Fish and Wildlife Service. DW worked with the HMP team before preparation of the EIR/EIS to incorporate the HMP into DW's proposed project. The HMP team designed island habitats, habitat juxtaposition, and habitat management guidelines to achieve compensation and species goals.

for all four DW project islands to be exceeded. Water would be applied to the habitat islands in each month for management of acreages of open water and perennial wetlands, flooded seasonal wetlands, and irrigated croplands specified in the HMP. Approximately 19 TAF would be diverted annually onto the habitat islands.

Water would be discharged from the habitat islands based on wetland and wildlife management needs. Typically, water would be drawn down by May and the habitat islands would remain dry until September, except for permanent water areas and other areas kept wet because of vegetation needs. Existing pumps would be used for discharges and for water circulation on the habitat islands. If new appropriative rights were approved for the water diverted onto the islands for wetland and wildlife management needs, DW could potentially sell that water when it is discharged; however, such discharge will not conflict with the HMP.

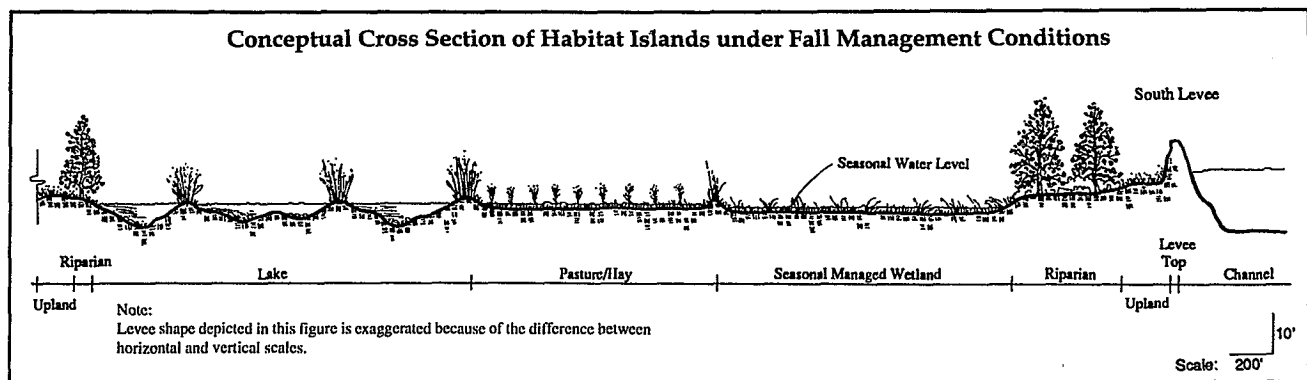
The maximum rate of proposed discharges from Bouldin Island and Holland Tract would be 200 cfs per island. Discharges from the habitat islands for export would not cause the combined maximum daily average discharge rate of 6,000 cfs and the average monthly rate of 4,000 cfs for all four DW project islands to be exceeded.

Improvements and Maintenance of Perimeter Levees

Levee improvements on the habitat islands would be designed, at a minimum, to meet criteria for levees outlined in DWR Bulletin 192-82. Routine maintenance activities on habitat island perimeter levees would not differ from current practices and would include replenishing riprap, placing fill material, placing gravel, reshaping fill material, grading, disking, mowing, selectively burning, controlling rodents, and installing rock revetment. Interior slopes of perimeter levees on the habitat islands would be planted with grass to resist erosion from rainfall and would be maintained according to current practices. In accord with the HMP, borrow material for levee improvement and maintenance would be extracted at designated locations from the island interiors before the beginning of habitat development and intermittently as needed thereafter.

Water Management Facilities for Habitat Creation

Water would be diverted to and discharged from the habitat islands with existing facilities, with newly installed fish screens on the siphons for diversions.



Operations and Maintenance

Operation and maintenance activities for the habitat islands under Alternatives 1 and 2 would include:

- operations and routine maintenance of the siphon and pump units;
- management of habitat areas, including, but not limited to, the control of undesirable plant species, agricultural plantings and irrigation, and the maintenance or modification of inner levees, circulation ditches, canals, open water, and water control structures to facilitate flooding and drainage;
- maintenance and monitoring of fish screens during water diversions for habitat maintenance;
- wildlife and habitat monitoring for the HMP;
- inspections and maintenance of perimeter levees;
- use of the Bouldin Island airstrip for seed dispersal and application of herbicides and other pesticides;
- operation of recreation facilities; and
- monitoring and enforcement of hunting restrictions.

Other operation and maintenance measures required to mitigate impacts associated with the DW project are described for each resource area in the respective chapters of the EIR/EIS.

Recreation Facilities

Recreation facilities on the habitat islands would be similar to those described above for the reservoir islands. Consistent with the HMP, DW would construct up to 10 new recreation facilities on Bouldin Island and six new recreation facilities on Holland Tract. The HMP designates open hunting areas for waterfowl and upland hunting, as well as closed zones where hunting is prohibited.

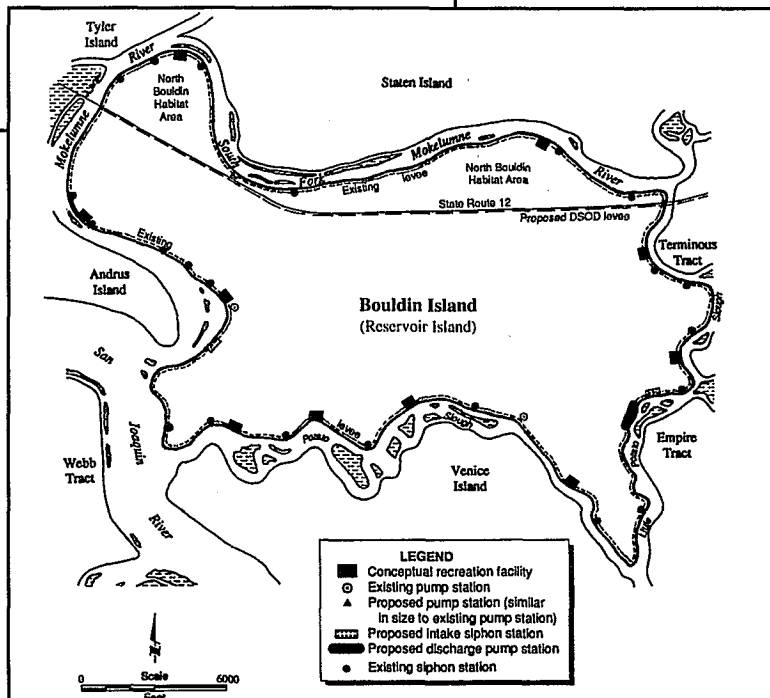
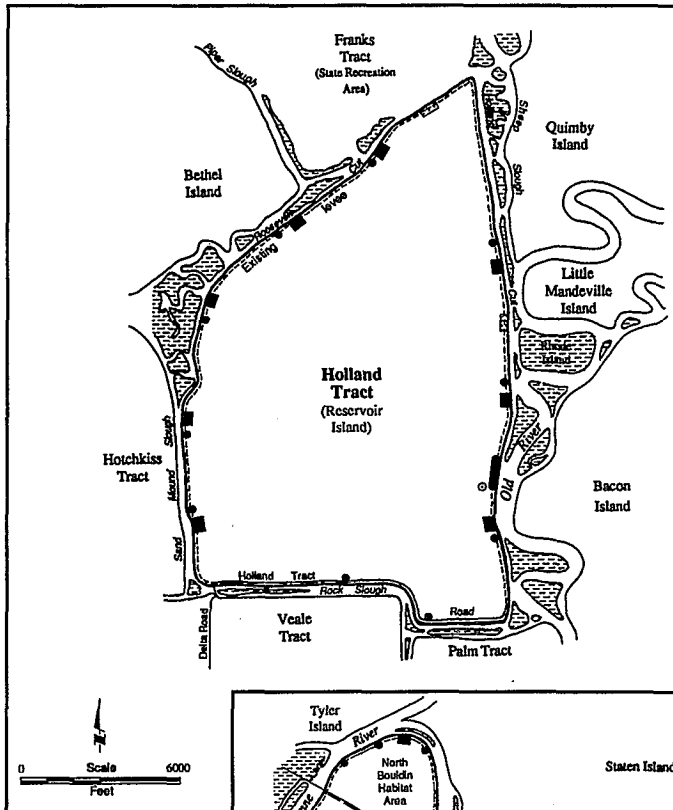
The Bouldin Island airstrip would be available for use by hunters and other recreationists to fly to the island. The airstrip

is currently used for agricultural operations. To reduce disturbances to wildlife, restrictions specified in the HMP have been placed on operation of fixed-wing aircraft and helicopters on the habitat islands during the waterfowl season.

ALTERNATIVE 3

Under Alternative 3, all four DW project islands would be managed for year-round diversion and storage of water. This alternative represents the maximum water appropriations that would be achieved by SWRCB granting DW's water right applications. This alternative also represents the maximum amount of water storage that would be feasible on the four project islands based on levee height and internal elevation. Project operations

under this alternative would be the same as those under Alternative 2 with respect to diversion and discharge operations (except for diversion and discharge rates) and construction and operation of recreation facilities; however, this alternative would allow year-round water diversions on all four DW project



islands and would require substantially greater investments in internal levee construction to protect State Route (SR) 12 on Bouldin Island.

Operations on Bacon Island and Webb Tract would be the same as those described for Alternative 2. Bouldin Island and Holland Tract would be operated for water storage similar to Webb Tract and Bacon Island, rather than for wetland habitat creation. Alternative 3 would include the area on Holland Tract excluded from the project area under Alternatives 1 and 2 but would not preclude the operation of the marinas located on the channel side of Holland Tract's southern perimeter levee. Under Alternative 3, a habitat reserve would be created north of SR 12 on Bouldin Island to compensate for some of the wildlife habitat and wetland impacts associated with water storage operations. Additional offsite wildlife habitat and wetland compensation would be required for this alternative.

THE NO-PROJECT ALTERNATIVE

If Corps permit applications or SWRCB water right permit applications for the DW project are denied, DW would implement intensive agricultural operations on the four project islands or sell the property to another entity that would likely implement intensive agriculture. The No-Project Alternative is based on the assumption that intensified agricultural conditions represent the most realistic scenario for the DW project islands if permit applications are denied. It is assumed that no new recreation facilities would be built.

Changes in project island operations under the No-Project Alternative would be limited to those farming activities that increase cropping intensity and could be implemented without a permit issued by the Corps or SWRCB. The No-Project Alternative would entail implementing more efficient drainage and weed management practices on Holland and Webb Tracts and shifting some crop types on Bacon and Bouldin Islands.

COORDINATION WITH WATER RIGHTS, DELTA STANDARDS, AND FISH TAKE LIMITS

The project's permits, if granted by SWRCB, would contain terms and conditions to protect prior water right holders and the public interest and public trust. All existing and any future Delta standards regarding water quality, flow, and diversions would be applicable to the DW project alternatives as appropriate. The project permits would require that project diversions not interfere with the diversion and use of water by any other user with riparian or prior appropriative rights.

Coordination regarding Senior Water Rights

Most holders of riparian and senior appropriative water rights are located upstream of the Delta in the Sacramento or San Joaquin River Basins. Many holders of riparian rights are located in the Delta, and senior appropriative water rights are also held in the Delta by the SWP and the CVP, as well as Contra Costa Water District (CCWD) and several smaller diverters. The DW project would not interfere with diversions by these senior water right holders.

The DWR Division of Operations and Maintenance and U.S. Bureau of Reclamation's (Reclamation's) Central Valley Operations Coordinating Office (CVOCO) maintain the official daily water budget estimates for the Delta and designate the Delta condition each day as being "in balance" or "in excess". The term "in balance" indicates that all Delta inflow is required to meet Delta objectives and satisfy diversions by CCWD, the CVP, the SWP, and Delta riparian and senior appropriative water users. Under all circumstances, when the Delta condition is designated to be in balance, no additional water would be available for diversion by the DW project under new water rights.

When DWR and CVOCO determine the Delta condition to be in excess and other terms and conditions are met, the DW project would be allowed to divert available excess water for storage on the designated reservoir islands under new appropriative water rights. DW diversions under existing riparian and senior appropriative rights may be permitted for shallow-water management, subject to applicable water right laws, even when the Delta is determined to be in balance. The daily quantity of available excess water would be estimated according to DWR's normal accounting procedures. To provide extra protection for compliance with the 1995 WQCP, SWRCB may establish requirements for amounts of water within the designated excess water (i.e., buffers) that would not be available for DW diversions, or other measures to protect Delta objectives, existing water right holders, and public trust values. Nevertheless, during major runoff events, excess Delta inflow will likely be available for diversion by the DW project.

Coordination regarding Water Quality Standards

All existing and any future Delta water quality standards adopted by SWRCB or other regulatory agencies would be applicable to the proposed diversions. Project operations for water storage would not be allowed to violate applicable Delta water quality objectives and public trust values or interfere with the ability of other projects to meet the objectives.

The DW project permits would contain terms and conditions that specify the allowable project operations for a variety of possible Delta conditions related to water quality or fish and wildlife requirements. SWRCB terms and conditions for the requested DW water rights would specify DW operational rules and guidelines related to meeting applicable Delta objectives.

Coordination regarding Endangered Species

Under the federal Endangered Species Act, biological opinions would identify DW project operational criteria, take limits, and facility design (i.e., fish screen criteria) for winter-run chinook salmon, delta smelt, and possibly Sacramento splittail. The project permits would require that project operations fully comply with any applicable Endangered Species Act conditions and allowable take limits as specified in the biological opinions. Water exported from the DW reservoir islands will be subject to all applicable biological opinion requirements at the SWP and CVP export facilities.

SUMMARY OF THE EIR/EIS IMPACT ASSESSMENT

Approach to Impact Analysis

The impact analysis for each resource topic identifies and compares the probable impacts of each alternative specific to the resource topic. These comparative analyses highlight differences and similarities in predicted impacts between the alternatives. For those resource chapters not addressing water resources, impacts were assessed through comparison between expected conditions associated with the DW project alternatives and existing conditions. For the chapters assessing water resource effects of the DW project (Chapter 3A, "Water Supply and Water Project Operations"; Chapter 3B, "Hydrodynamics"; Chapter 3C, "Water Quality"; and Chapter 3F, "Fishery Resources"), impacts were assessed through comparison between simulated conditions associated with the DW project alternatives and those associated with the No-Project Alternative.

The impact analysis used in the resource chapters was designed to comply with CEQA and NEPA guidelines. For each topic area, three levels of impacts were considered:

- direct impacts on the DW project islands and on adjacent Delta channels;

Resource Areas Analyzed

Water Supply and Water
Project Operations

Hydrodynamics

Water Quality

Fishery Resources

Vegetation and Wetlands

Wildlife

Mosquitos and Public Health

Flood Control

Cultural Resources

Land Use and Agriculture

Recreation and Visual Resources

Utilities and Highways

Traffic

Air Quality

Economic Conditions and Effects

- indirect impacts on the project vicinity, including the Delta, Suisun Marsh, San Francisco Bay, and, in some cases, upstream areas, induced by direct project-related changes in the environment; and
- cumulative impacts.

The study area for analysis of direct project impacts consists of the four project islands, surrounding channels, and adjacent islands. The study area for analysis of indirect impacts is the statutory Delta, as defined by Section 12220 of the California Water Code; the hydrologically related Suisun Marsh and San Francisco Bay; and, in some cases, upstream areas. The study area for cumulative impact analysis consists of the combination of the direct and indirect impact areas. However, most upstream and all downstream areas that may be affected because of speculative future uses of the DW project were not analyzed in this EIR/EIS.

Where uncertainty exists in predicting the extent of project construction and operations, the impact analysis is based on "worst-case" conditions. For example, because DW is uncertain of the size of the various recreation facilities, the impact analysis is based on the assumption that the largest possible facility would be built at all locations even though it may not be realistic to have a facility of this size at every location.

Where the DW project alternatives are predicted to cause significant impacts, mitigation measures are identified. In accordance with CEQA and NEPA guidelines, measures are proposed that would avoid, minimize, rectify, reduce, or compensate for the predicted impacts, thereby reducing them to less-than-significant levels. The feasibility and effectiveness of the mitigation measures are described to the extent possible. Mitigation measures may include modifying the project design or operations to reduce the level of predicted impact.

Water Supply and Water Project Operations

The EIR/EIS provides an overview of historical Delta water supply conditions, describes the water budget for the DW project islands, discusses possible effects of the DW project on water available for export, and describes potential impacts of the DW project alternatives on consumptive use. Delta island consumptive use is water supplied by rainfall and channel depletion that is lost from Delta islands through crop evapotranspiration (ET) and open-water evaporation. The Delta Standards and Operations Simulation (DeltaSOS) model was used to simulate water supply conditions under the DW project alternatives and the No-Project Alternative; DeltaSOS modeling was based on the initial water budget developed from results of simulations performed by DWR using the operations planning model DWRSIM. The simulations were performed using the 70-year hydrologic record for the Delta tributaries but assumed that

Delta operations would comply with 1995 WQCP objectives and existing SWP export limits and would operate according to DWR's estimate of current levels of demand. Cumulative conditions were simulated also with the 1995 WQCP objectives but included full SWP pumping capacity. Results of the DeltaSOS modeling were used as a basis for analysis of DW project effects on other resources.

The DW project would be required to operate under all applicable standards for protection of Delta water quality, fish and wildlife uses, and other resources and would be precluded from interfering with the ability of those holding senior water rights to comply with Delta standards. Implementation of the DW project alternatives is expected to increase water available for annual Delta exports; however, changes in export water supply are not considered in themselves to be beneficial or adverse impacts, and these changes are described in the EIR/EIS but are not assessed for impact significance.

Implementation of Alternative 1 is expected to result in a less-than-significant increase in Delta consumptive use. Implementation of Alternative 2 is expected to result in a beneficial decrease in Delta consumptive use. Implementation of Alternative 3 is expected to result in a significant and unavoidable increase in Delta consumptive use. Under cumulative conditions, implementation of Alternative 1, 2, or 3 would result in a beneficial decrease in consumptive use. Under the No-Project Alternative, consumptive use would increase, but not measurably so at the scale of monthly water supply modeling.

Hydrodynamics

Delta hydrodynamic conditions are the influences on the movement of water in Delta channels (e.g., tidal forces and inflows) and the effects of the movement of water in Delta channels (e.g., changes in channel flows and stages, export flows, and outflow). The EIR/EIS describes Delta hydrodynamic conditions; discusses the Delta model developed by Resource Management Associates (RMA), which was used to simulate hydrodynamic effects of the DW project; identifies Delta hydrodynamic variables that could be affected by operation of the DW project; and presents results of simulations using the RMA model to determine DW project effects on those variables.

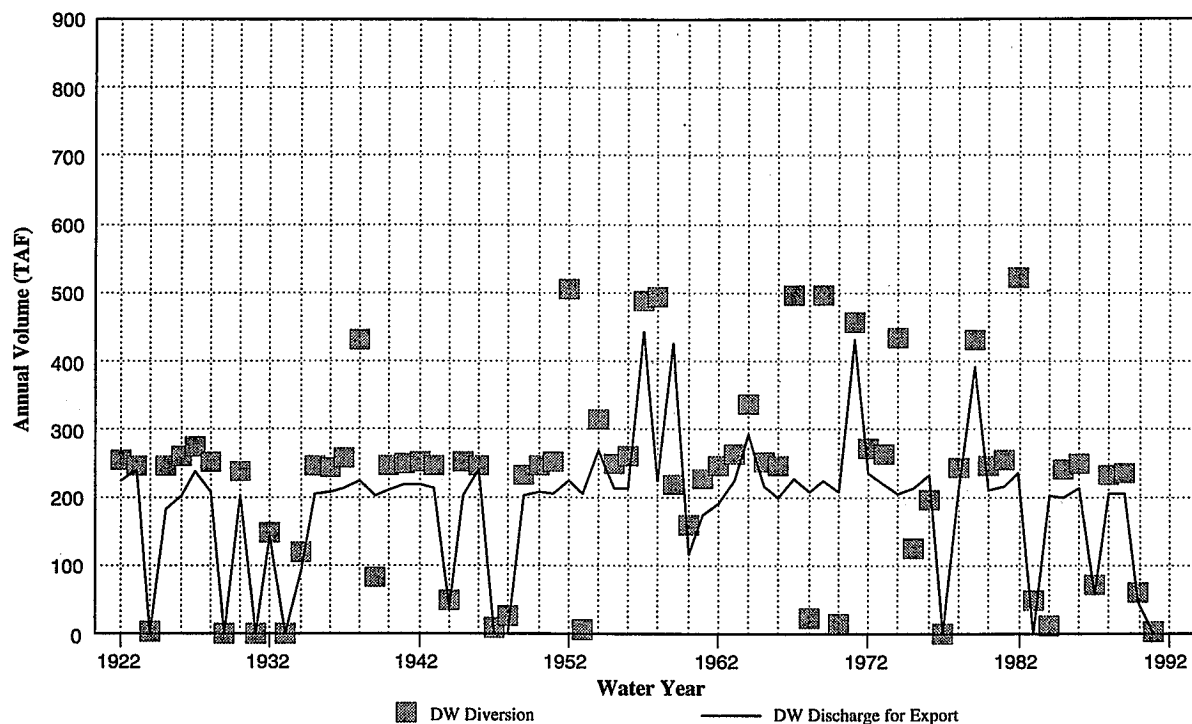
Delta hydrodynamic variables considered in the initial selection process for the hydrodynamics impact assessment were local Delta channel velocities and stages, export flows, outflows, net channel flows, and inflow source contributions. Because the most important effects of changes in outflow and changes in inflow source contributions are linked with potential water quality or fishery impacts, DW project effects associated with these changes are addressed in Chapter 3C, "Water Quality", and Chapter 3F, "Fishery Resources", of the EIR/EIS. DW project effects on exports are discussed in Chapter 3A, "Water Supply and Water Project Operations". Potential effects of DW

DeltaSOS Model

DeltaSOS is the monthly Delta operations model developed by Jones & Stokes Associates to evaluate compliance of specified Delta water management operations, such as DW's proposed in-Delta storage project, with Delta standards. DeltaSOS simulates operations of a project according to a specified set of assumptions regarding facilities, demand for exports, and Delta standards. The simulations are based on an initial Delta water budget provided by DWR's DWRSIM model. The DWRSIM model simulates Delta operations (e.g., channel flows, exports, and outflow) that would occur on a monthly basis with present-day facilities, current operational rules for the SWP and the CVP, and current water demands. DeltaSOS simulations are also based on implementation of the 1995 WQCP Delta objectives under the range of hydrologic conditions represented by the 70-year hydrologic record (water years 1922-1991) for the Delta. DeltaSOS allows the user to specify alternative operations of the project under analysis and includes several switches for specifying alternative monthly Delta and upstream operations and facilities. The model thus provides a general analysis tool for evaluating a wide range of possible future Delta standards and likely future operations that would comply with these standards.

DeltaSOS was used to simulate monthly water management operations of the DW project alternatives and the No-Project Alternative, which was used as the baseline for impact assessment. The model reports diversions to storage, end-of-month storage, and discharges for export. Results also include final total Delta export, Delta outflow, and selected channel flows.

Annual DW Diversion and DW Discharge for Export under Alternative 1, Simulated with DeltaSOS Based on the Hydrologic Record for 1922-1991



project diversions and discharges on local channel velocities and stages and on net channel flows are described below.

DW project operations under Alternative 1, 2, or 3 would have less-than-significant effects on local channel velocities and stages and on net channel flows. Under cumulative conditions, however, implementation of Alternative 1, 2, or 3 could contribute to a significant effect on net channel flows. This cumulative impact would be reduced to a less-than-significant level through monitoring of the effects of DW operations and control of operations to prevent unacceptable hydrodynamic effects during periods of flows that are higher than historical flows. The No-Project Alternative would not cause adverse effects on Delta hydrodynamic conditions.

Water Quality

The maintenance of beneficial uses of Delta waters depends on the levels of several key water quality variables (constituent concentrations and other water quality characteristics, such as temperature) in Delta waters. Those key water quality variables, objectives associated with maintaining beneficial uses of Delta waters, existing Delta water quality conditions, and impacts of the DW project on levels of key variables in Delta channels and exports are described in the EIR/EIS. Information is also presented on estimated historical Delta water quality conditions to provide a context for assessing water quality effects of the No-Project Alternative.

Diverting water onto the DW project islands would reduce Delta outflows and could increase salinity in Delta channels or exports. Discharges from the DW project islands could contribute to changes in concentrations of water quality constituents and other variables in Delta channel receiving waters and Delta exports. Variables that could be adversely affected are salinity, concentrations of dissolved organic carbon (DOC), temperature, suspended sediments (SS), dissolved oxygen (DO), and chlorophyll. Increases in DOC and salinity could indirectly increase trihalomethanes (THMs) in treated drinking water supplies that are exported from the Delta. Also of concern are pollutants that may remain in some DW island soils as a result of past agricultural and waste disposal activities; if pollutants are present, they could contaminate stored water that is later discharged into Delta channels.

Water quality impacts of salinity increases were assessed for Chipps Islands, Emmaton, Jersey Point, and Delta exports (representative of diversions at CCWD Rock Slough intake and SWP Banks and CVP Tracy Pumping Plants). Water quality impacts of increases in DOC and resulting THM concentrations were assessed for Delta exports. Impacts of other variables and potential water pollutants in island soils were assessed qualitatively because quantitative models for these variables are not presently available.

DW project diversions under Alternative 1, 2, or 3 could result in significant salinity increases at Chipps Island, Emmaton, and Jersey Point and in Delta exports during periods of low Delta outflow. These impacts would be reduced to less-than-significant levels through adjustments made to DW project diversions based on salinity estimates at these locations with and without DW project diversions. DW project discharges under Alternative 1, 2, or 3 could result in significant elevations of DOC concentrations in Delta exports and elevations of THM concentrations in treated drinking water. These impacts would be reduced to less-than-significant levels through adjustments of DW project discharges based on measurements of DOC and bromide in stored water during intended discharge periods and monitoring of channel receiving waters.

DW project discharges under Alternative 1, 2, or 3 could also result in significant changes in other water quality variables (temperature, SS, DO, and chlorophyll) in Delta channel receiving waters. This impact would be

Example of Determination of Significant Water Quality Impacts at Chipps Island under Alternative 1, Based on 1922-1991 Simulation Results			
No-Project Effective Outflow (cfs)	DW Diversion (cfs) (>500 cfs)	Change in Chipps EC (µS/cm)	Alt 1 Chipps EC (µS/cm)
November			
Outflow Objective: 4,500 cfs Equivalent EC: 10,000 µS/cm 20% Change: 2,000 µS/cm 90% Limit: 9,000 µS/cm			
8,176	3,606	<u>3,248</u>	7,932
9,162	4,000	<u>2,991</u>	6,683
7,107	2,939	<u>2,979</u>	9,050
8,389	1,328	<u>2,029</u>	6,477
11,338	4,000	1,779	3,986
11,639	4,000	1,741	3,798
6,609	1,196	1,416	8,272
14,110	3,373	958	2,136
13,857	4,000	939	2,185
13,846	654	648	1,896
15,371	4,000	544	1,444
18,663	2,258	354	833
17,638	4,000	346	922
25,347	906	78	290
31,138	4,000	14	178
40,244	4,000	1	153

1. Specify appropriate EC criteria based on the 1995 WQCP outflow or EC objectives.
2. Estimate Chipps Island EC for the No-Project Alternative and DW project operations.
3. Determine DW project effects and mitigation requirements.
4. Underlining indicates significant impacts that would require mitigation.

Compliance with the Endangered Species Act

Section 7 of the Endangered Species Act of 1973, as amended, requires federal agencies, in consultation with USFWS and NMFS, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of these species.

The California Endangered Species Act (CESA) requires state agencies, which are lead agencies for purposes of CEQA, to consult with DFG to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species.

The Section 7/CESA consultation process for the DW project has been initiated with the Sacramento Endangered Species Office of USFWS, NMFS, and DFG. A biological assessment (BA) for fish species was submitted to USFWS, and NMFS for their review and concurrence on June 22, 1995. The Corps' request for formal consultation with USFWS and NMFS was submitted on July 10, 1995. A BA on terrestrial species and a request for formal consultation was submitted to USFWS for USFWS review and concurrence on July 31, 1995. The CESA consultation process is coordinated with the release of the EIR/EIS.

reduced to a less-than-significant level through adjustments of DW project discharges based on measurements of these variables in stored water during intended discharge periods and monitoring in channel receiving waters. Potential contamination of stored water by pollutant residues under Alternative 1, 2, or 3 would also be a significant impact. This impact would be reduced to a less-than-significant level through assessment and necessary remediation of soil contamination prior to project implementation to eliminate sources of potential contamination.

Water quality impacts under cumulative conditions would be similar to the direct and indirect impacts described above for Alternatives 1, 2, and 3. Additionally, use of the recreation facilities constructed on the DW project islands would contribute to pollutant loading in the Delta from regional boating activities. The potential increase in pollutant loading from the DW project facilities and boating activities under Alternative 1, 2, or 3, in combination with other boating facilities in the Delta, is considered a significant and unavoidable cumulative impact.

Implementation of the No-Project Alternative would not result in measurable water quality effects relative to existing conditions.

Fishery Resources

The EIR/EIS analyzes the potential for impacts of DW project operations on chinook salmon, striped bass, American shad, delta smelt, Sacramento splittail, and longfin smelt and on their habitats. Effects on these species encompass the range of potential responses of Delta fish species to DW project operations.

DW project operations and facilities under Alternative 1, 2, or 3 could cause or contribute to significant impacts on fish population abundance. These impacts would be avoided or reduced to less-than-significant levels, however, through implementation of appropriate management actions, monitoring of DW project operations, and operation of the DW project according to specified operations objectives. The following significant potential impacts were identified:

- Construction of DW project facilities could degrade spawning and rearing habitat, which could affect the localized reproductive success of delta smelt, Sacramento splittail, and other Delta species.
- Discharge of water from the DW reservoir islands to adjacent channels could increase channel water temperature, which could reduce juvenile chinook salmon survival.
- DW project operations could affect flows during the peak out-migration period of Mokelumne and San Joaquin River chinook salmon, indirectly increasing chinook salmon mortality.

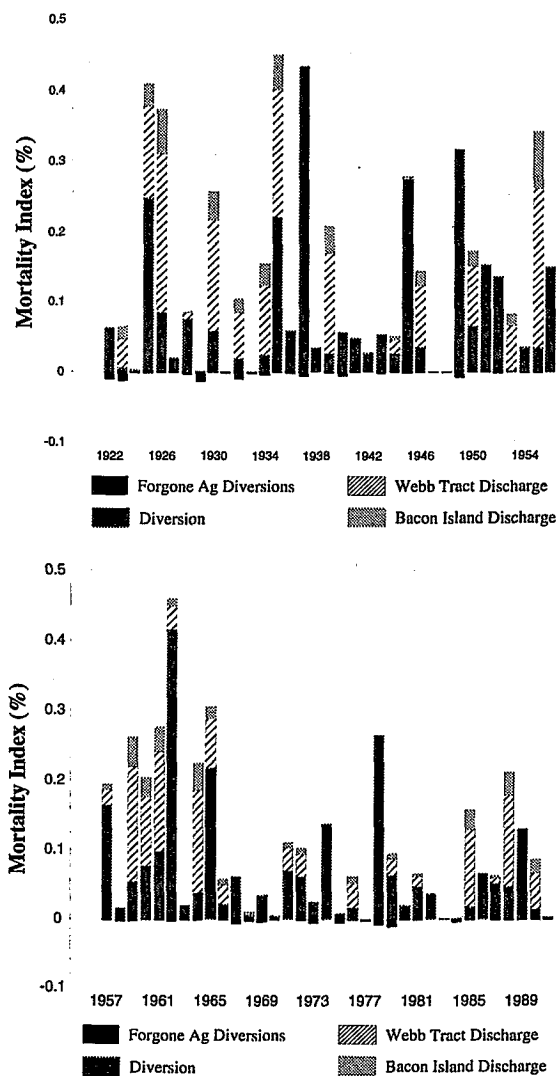
- DW project operations could reduce transport flows and increase entrainment loss, which could reduce the survival of striped bass eggs and larvae; delta smelt larvae; and, possibly, longfin smelt larvae.
- DW project diversions could indirectly increase entrainment losses during November- January, reducing survival of juvenile striped bass and delta smelt.

Impact avoidance and mitigation measures were developed to protect individual species and, when possible, to implement an ecosystem-based approach to sustain habitat conditions protective of multiple species and life stages throughout the Bay-Delta estuary. Implementing construction guidelines and replacing altered spawning and rearing habitat would compensate for potential fish habitat loss. Scheduling DW project discharges so they will not result in adverse water temperature changes in the Delta channels would avoid significant adverse temperature impacts on chinook salmon and other species. Proposed integration of monitoring of fish populations and flow conditions with operations criteria for diversion and discharge would reduce DW project effects related to entrainment and transport to less-than-significant levels. Use of efficient fish screens, in combination with the proposed operations criteria, would reduce entrainment loss effects to less-than-significant levels.

Implementation of Alternative 1, 2, or 3 would also result in the following less-than-significant impacts: a change in the area of optimal salinity habitat in the Delta, a potential increase in accidental spills of fuel and other materials at boat docks at the DW project islands, and an increase in entrainment loss of juvenile American shad and other species.

Effects on fish species and their habitats under the No-Project Alternative would not differ measurably from effects of current agricultural operations on the DW project islands.

Mortality Index for Winter-Run Chinook Salmon during Migration through the Delta Attributable to Forgone Agricultural Diversions, DW Reservoir Island Diversions, and Bacon Island and Webb Tract Discharge to Export, 1922-1991 Simulation



Note:
Forgone Agricultural Diversions is the difference between mortality attributable to agricultural diversions on the DW islands under the No-Project Alternative and mortality attributable to DW habitat island diversions.

Compliance with Section 404 of the Clean Water Act

Under Section 404 of the Clean Water Act, a Department of the Army permit must be obtained from the Corps for the discharge of dredged or fill material into waters of the United States, including wetlands. The Corps reviews applications for permits in accordance with Section 404 guidelines, which have been established by the Corps and EPA. The guidelines require that no discharge of dredged or fill materials shall be permitted for projects considered to be non-water dependent if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. The Corps also must determine that the project is not contrary to the public interest.

A delineation of Section 404 jurisdictional wetlands for the DW project was jointly conducted by the Natural Resources Conservation Service (NRCS) (formerly known as the U.S. Soil Conservation Service), the Corps, the U.S. Environmental Protection Agency (EPA), and USFWS. Jurisdictional wetland habitat types on the DW project islands include riparian, marsh, agricultural, and open-water habitats. Verification of delineated jurisdictional wetlands was issued by the Corps and NRCS on December 28, 1994, and January 13, 1995, respectively.

An alternatives analysis was prepared and submitted to EPA and the Corps in partial compliance with EPA's Section 404(b)(1) guidelines. The information from the EIR/EIS will be used to complete compliance with the Section 404(b)(1) requirements and will be used during the Corps' public interest review.

Vegetation and Wetlands

Impacts of the DW project on vegetation and wetland resources include conversion of existing vegetation conditions (primarily agricultural) on the reservoir islands to open-water, mudflat, herbaceous, and shallow-water wetland habitats and conversion of existing vegetation conditions (primarily agricultural) on the habitat islands to crops and upland, wetland, woodland, and scrub habitats.

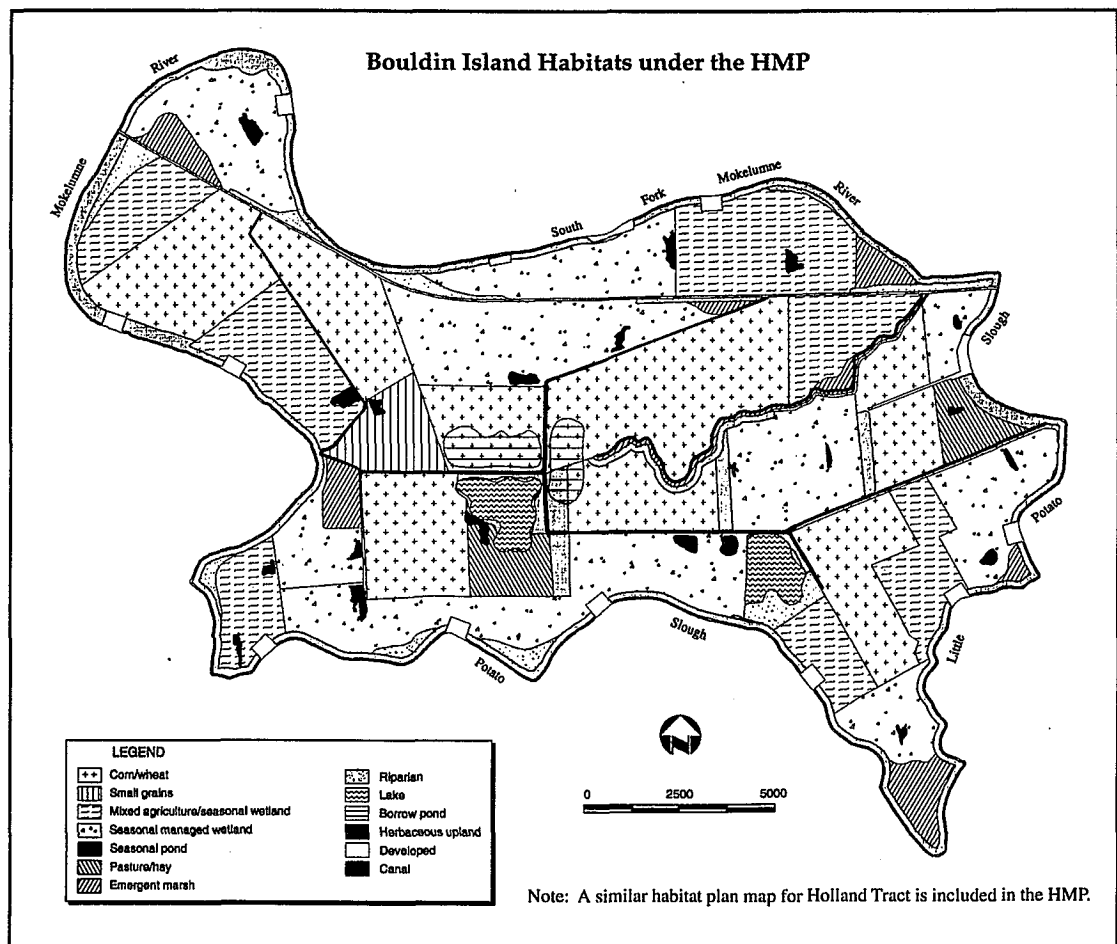
The impact analysis for the reservoir islands provides a description of vegetation and wetland values that would be associated with the various flood conditions on the reservoir islands; because future vegetation conditions are unpredictable, however, it is assumed that the reservoir islands would provide no wetland values that would compensate for project impacts.

Under Alternative 1, 2, or 3, construction of project facilities (e.g., siphon and pump stations or recreation facilities) and levee improvements on sites occupied by special-status plants could result in the loss of special-status plants; this would be considered a significant impact. Avoidance measures are recommended to reduce this impact to a less-than-significant level.

Implementing Alternative 1 or 2 would result in losses of riparian and permanent pond habitats and of upland and agricultural habitats. Losses in acreages of these jurisdictional wetland habitat types on the reservoir islands would be offset by creation of similar vegetation types on the habitat islands as described in the HMP; therefore, these losses are considered less than significant. Implementing the HMP under Alternative 1 or 2 would also result in a beneficial increase in freshwater marsh and exotic marsh habitats and the beneficial cumulative impact of an increase in wetland and riparian habitats in the Delta.

Under Alternative 3, the loss of jurisdictional wetlands on reservoir islands, including riparian, marsh, and pond habitats, would be considered a significant impact. Although a limited amount of habitat would be created in the NBHA to partially offset this impact, DW would need to develop and implement an offsite mitigation plan to reduce this impact to a less-than-significant level.

Under the No-Project Alternative, impacts would result primarily from conversion of fallow, herbaceous upland, riparian, and wetland habitats to agricultural use. In contrast to implementing any of the DW project alternatives, implementing the No-Project Alternative would decrease the diversity of vegetation types on the four DW islands. Implementing the No-Project Alternative would not result in direct disturbance of



special-status plants from construction of facilities as described for the DW project alternatives. However, as increasing land subsidence rates and flood risks become critical to levee stability over time, improvements to perimeter levees under the No-Project Alternative could adversely affect known populations of plants.

Wildlife

The impact analysis for the reservoir islands provides a description of wildlife values that would be associated with the various flood conditions on the reservoir islands; however, because future habitat conditions are unpredictable, no wildlife values that would compensate for project impacts are assumed to be provided on the reservoir islands. Impacts of the DW project on wildlife are associated with the conversion of existing habitats (primarily agricultural) to reservoir uses on the reservoir islands or to habitat types managed specifically to provide high wildlife habitat values on the habitat islands.

Under Alternatives 1 and 2, the habitat islands (Bouldin Island and Holland Tract) would be managed primarily to offset wildlife impacts resulting from operation of the reservoir islands. Implementation of the HMP developed for the habitat islands would result in creation of seasonal managed wetlands, emergent marshes, seasonal ponds, lakes, herbaceous uplands, riparian woodland and scrub habitats, pastures, and corn and wheat fields that would be managed specifically to provide high wildlife habitat values. In addition to offsetting project impacts on wildlife, implementation of the HMP is expected to benefit many special-status and other wildlife species that currently are not found or are found only irregularly on the DW project islands.

Implementation of Alternative 1 or 2 would result in changes to wildlife habitats on the DW project islands and therefore changes in the use of those islands by wildlife species. In general, flooding the reservoir islands would result in a loss of habitat and implementing the HMP would result in a gain in habitat.

Implementing Alternative 1 or 2 could result in increased incidence of waterfowl disease, which is considered a significant impact on wildlife. Implementing a program for monitoring waterfowl disease in cooperation with DFG would reduce this impact to a less-than-significant level. Significant temporary impacts on state-listed species could occur during construction on the reservoir islands but would be reduced through development and implementation of a mitigation and monitoring plan to avoid these impacts. Use of the Bouldin Island airstrip would be restricted by the HMP on hunt days during the waterfowl season. Under Alternative 1 or 2, use of the airstrip on hunt days could still result in disturbance to greater sandhill cranes and wintering waterfowl. This impact would be reduced to a less-than-significant level through implementation of a monitoring program to assess the effects of hunt-day flights on use of Bouldin Island by these species and implementation of actions to reduce any effects identified through monitoring.

Implementation of Alternative 1 or 2 would also result in less-than-significant losses of upland habitats, foraging habitats for wintering waterfowl, upland game species habitats, foraging habitat for Aleutian Canada goose, and wintering habitat for tricolored blackbird, and less-than-significant cumulative losses of riparian and herbaceous habitats. Other less-than-significant impacts would be the potential for disruption of waterfowl use and of greater sandhill crane use of the habitat islands as a result of increased hunting, increases in waterfowl harvest mortality, potential changes in local and regional waterfowl use patterns, and potential effects on wildlife and wildlife habitats resulting from Delta outflow changes. Implementing the HMP would result in beneficial increases in wetland habitats for nongame water and wading birds, waterfowl breeding habitats, foraging and roosting habitat for greater sandhill crane, foraging and nesting habitat for Swainson's hawk, nesting habitat for northern harrier and tricolored blackbird, and suitable habitats for special-

status wildlife species, as well as contribute to cumulative increases in wintering waterfowl habitat in the Delta region.

Alternative 3 does not include implementing the HMP, so impacts of reservoir island operations under this alternative on some wildlife habitats would not be offset by created habitats and are considered significant. Significant impacts would be losses of upland habitats, foraging habitats for wintering waterfowl, habitats for upland game species, foraging habitats for greater sandhill crane and Swainson's hawk, and nesting habitat for northern harrier. To offset these impacts, an offsite wildlife habitat mitigation plan would be required for Alternative 3. Implementation of Alternative 3 would result in the following less-than-significant impacts, as under Alternative 1 or 2: losses of foraging habitat for Aleutian Canada goose and nesting habitat for tricolored blackbird, potential for disruption of waterfowl use as a result of increased hunting, increases in waterfowl harvest mortality, potential changes in local and regional waterfowl use patterns, and potential effects on wildlife and wildlife habitats resulting from Delta outflow changes. Alternative 3 would also contribute to less-than-significant cumulative losses of foraging habitat for wintering waterfowl, herbaceous habitat, and wetland and riparian habitats in the Delta. Implementation of Alternative 3 could result in a beneficial increase in suitable waterfowl breeding habitat.

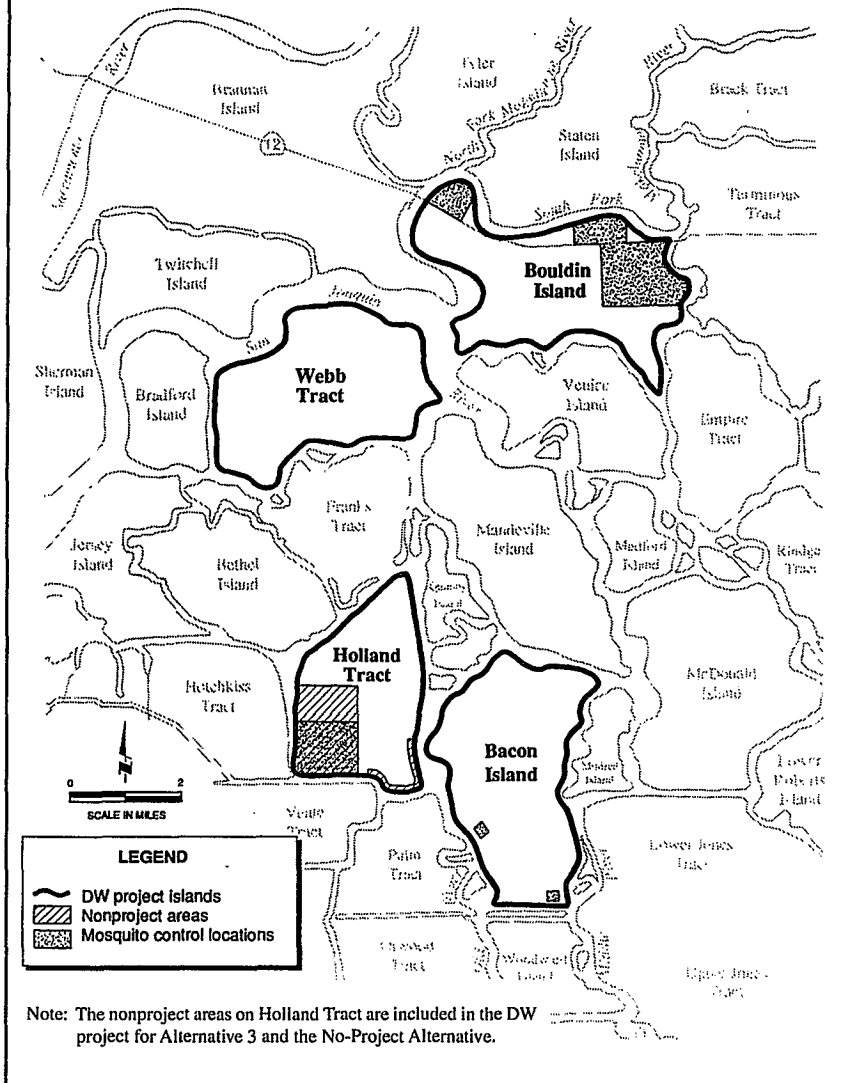
Implementation of the No-Project Alternative would change wildlife habitat on the DW project islands by converting fallow, herbaceous upland, riparian, and wetland habitats to crops. The effects of the No-Project Alternative would be losses of riparian and wetland habitats, northern harrier nesting habitat, and potential Swainson's hawk foraging habitat. These effects could be reduced through development and implementation of an offsite mitigation plan, but such mitigation would not be required.

Mosquitos and Public Health

Public health concerns are related to transmission of disease by mosquitos and wildlife vectors in the Delta. The EIR/EIS describes mosquito control and abatement practices on the DW project islands and assesses potential impacts of the DW project alternatives on mosquito production levels, mosquito abatement requirements, and transmission of diseases by wildlife.

The potential for creation of mosquito breeding habitat on the reservoir islands under Alternative 1, 2, or 3 was assessed for five habitat condition classes: full storage, partial storage, shallow storage, nonstorage, and shallow-water wetland. Shallow-water wetland conditions would have the greatest potential for producing problem numbers of mosquitos. The impact analysis presented in the EIR/EIS assumes, as a worst-case analysis, that water would be stored and released on the reservoir islands in a manner that would create the largest acreage of shallow-water wetlands during mosquito breeding

Mosquito Control Locations on the DW Project Islands, 1991-1992



seasons. If the reservoir islands are used for water transfers and banking, the frequency of storage periods is expected to increase and the frequency of nonstorage periods and shallow-water wetland periods is expected to decrease. However, conditions under water transfers and banking are speculative and were not used in the analysis of impacts. Under Alternative 1 or 2, seasonal and permanent wetland and seasonal flooded agricultural habitats that would be created on the habitat islands and managed for wildlife would also provide potential mosquito breeding sites during flood periods.

Implementing Alternative 1, 2, or 3 could result in the need for a significant increase in abatement levels on the DW project islands. Coordination with responsible mosquito abatement districts (MADs) and implementation of appropriate abatement practices would offset the creation of potential mosquito production sources under the DW project alternatives. The DW project would also contribute to the cumulative increase in mosquito abatement needs resulting from implementation of future projects in the Delta that benefit mosquito breeding conditions (e.g., projects

for wetland habitat restoration) or that increase human populations near existing mosquito production areas (e.g., residential housing and marina developments). This cumulative impact is considered significant and unavoidable.

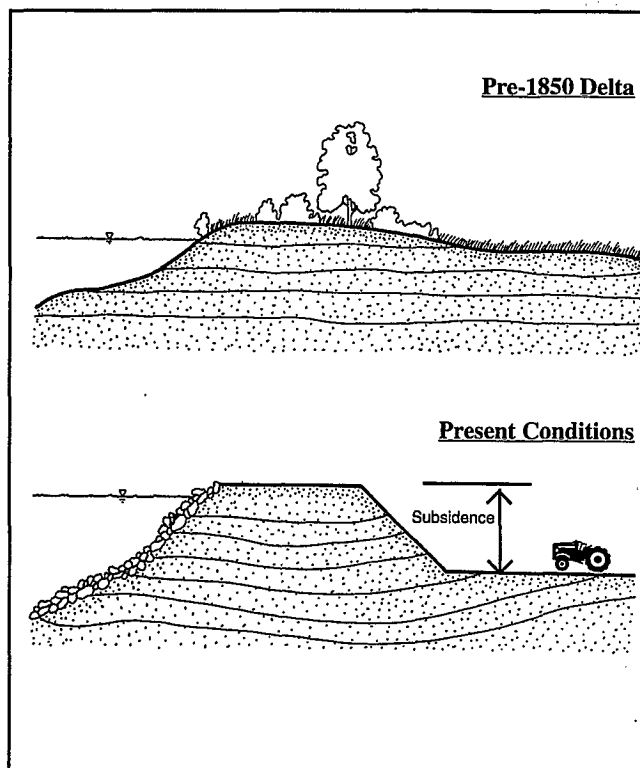
Implementing Alternative 1, 2, or 3 would also result in the beneficial impact of reducing or eliminating the need for mosquito abatement activities during full-storage periods on the reservoir islands.

Exposure of people to wildlife species that transmit diseases could increase on the habitat islands under Alternatives 1 or 2. However, this impact is considered less than significant because wildlife-transmitted diseases are not considered a significant risk to public health in the Delta, and the increase in risk under Alternative 1 or 2 would be minor.

The No-Project Alternative would benefit mosquito abatement needs by eliminating habitats considered problem mosquito production sources. However, increased corn production under the No-Project Alternative, primarily on Holland and Webb Tracts, could result in a substantial increase in mosquito production during the fall flooding. Coordination with responsible MADs and implementation of appropriate abatement practices would offset the effects of fall flooding practices under the No-Project Alternative.

Flood Control

Key flood control issues on the DW project islands are reliability of interior and exterior levees around the DW project islands, seepage impacts on neighboring islands, and effects of wind and wave erosion on levees. Features and programs incorporated into Alternatives 1, 2, and 3 would limit potential flood control impacts to less-than-significant levels. Less-than-significant impacts are the potential for seepage from reservoir islands to adjacent islands, wind and wave erosion on reservoir islands, and erosion of levee toe berms at new facilities on the reservoir islands. No significant impacts are projected to occur under Alternative 1, 2, or 3.



Subsidence in the Delta

Prior to reclamation for agriculture, the Delta was a tidally influenced marshland and swampland. Reclamation began in 1850, and in 1868, when responsibility for reclamation was given to landowners and their reclamation districts, Delta island reclamation began on a large scale. By the mid-1940s the Delta had been completely transformed from a tidal wetland to a series of channels separated by islands protected by levees.

The Delta levee system initially served to control island flooding, but today the levees are necessary to prevent inundation of island interiors during normal runoff and tidal cycles because island interiors have been lowered by extensive soil subsidence.

On Delta islands, subsidence is primarily a result of microbial decomposition, topsoil erosion, and oxidation of the islands' peat soil. Organic soil (peat) is formed by the accumulation of decomposed vegetation in bogs, marshes, or swamp forests. Organic soil is primarily lost through exposure of peat to oxygen, which converts organic carbon solids to carbon dioxide and aqueous carbon.

Agricultural practices have greatly contributed to high subsidence rates on Delta islands. Land disturbance associated with agricultural practices (e.g., plowing) expose the Delta's organic soils to oxygen, resulting in more rapid lowering of land levels.

Historically, subsidence in the Delta has occurred at rates that are among the highest in the world. The land surface of some Delta islands is subsiding at a rate of 2-3 inches per year. Levees that originally were built 2-3 feet above ground level must now be maintained, in many cases, at heights of more than 20 feet above ground level as a result of interior island subsidence.

If current DW agricultural practices continue, the surfaces of the interior peat soil of the DW islands will decline roughly 6-10 feet over the next 50 years (peat layers are assumed to be at least 10 feet thick). If the existing DW island levees are maintained and built to greater heights to compensate for the subsidence under current agricultural practices, hydrostatic pressures on the levees would increase and greatly increase the risk of levee failure. As levees are built to greater heights, maintenance costs would increase, and reclamation costs would be higher if a levee failure occurred.

Implementing the DW project would slow the rate of subsidence on the DW project islands relative to subsidence rates under existing agricultural use. Proposed water storage and habitat management use would reduce ground-disturbing activities. Decreased subsidence would contribute to increased long-term levee stability on the DW project islands.

Compliance with Section 106 of the National Historic Preservation Act

Section 106 of the National Historic Preservation Act requires federal agencies to evaluate the effects of federal undertakings on historical, archaeological, and cultural resources. Agencies are required to identify historical or archaeological properties near proposed project sites that are listed in the NRHP. For those historical or archaeological properties discovered that are not listed in the NRHP, an evaluation of eligibility for NRHP listing is required. If it is determined that the project would have an adverse effect on NRHP-listed properties or those eligible for listing in the NRHP, the agencies are required to consult with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation to develop alternatives or mitigation measures to allow the project to proceed.

Section 106 consultation with the SHPO has been initiated for the DW project. A programmatic agreement outlining the steps and timing of compliance with Section 106 and addressing the project's potential effect on cultural resources has been drafted and is being circulated for signature by the Advisory Council on Historic Preservation, the SHPO, the Corps, SWRCB, and the project applicant.

In general, the levee buttressing and maintenance program proposed by DW for Alternative 1, 2, or 3 would have several beneficial impacts. It would increase the long-term stability of perimeter levees on the DW project islands, decrease the potential for levee failure during seismic activity, reduce the cumulative flooding hazard in the Delta, and reduce long-term public costs for levee maintenance and repair around the reservoir islands. By decelerating the rate of subsidence relative to existing conditions on the habitat islands, implementing Alternative 1 or 2 would also improve long-term levee stability on the habitat islands.

Because the rate of subsidence would increase under the No-Project Alternative, levee stability would decline over time and the potential for seepage and for levee failure during seismic activity would increase. The cumulative risk of levee failure would increase under the No-Project Alternative. The perimeter levees could be substantially buttressed and improved to increase long-term levee stability.

Cultural Resources

Several cultural resource issues are associated with the DW project islands. Bacon Island contains historic-period archaeological sites and architectural properties, most of which represent early 20th century agricultural development and use. Bacon Island resources appear to represent a cohesive record of agricultural development in the Delta and may be eligible for listing in the National Register of Historic Places (NRHP) as a historic district. Webb Tract contains several areas of Piper soils, where prehistoric burials may be present; therefore, the sites may be important to Native Americans. One of the historic sites identified on Bouldin Island appears to be eligible for NRHP listing. Three of the prehistoric archaeological sites identified on Holland Tract may be eligible for NRHP listing and may have importance to Native Americans as prehistoric burial sites; additional archaeological resources may also be present in the Piper soils on the island.

Implementation of the DW project alternatives could result in several significant impacts: demolition of the historic district on Bacon Island and disturbance of prehistoric buried resources that may be present on Webb Tract, the archaeological site on Bouldin Island that may be eligible for NRHP listing, and intact burials and buried prehistoric resources possibly present on Holland Tract. Implementation of Alternative 3 would result in the additional significant impact of damage or destruction of prehistoric resources on Holland Tract as a result of inundation.

Although measures to document and preserve information about the resources are recommended to reduce the impact on the NRHP-eligible district on Bacon Island, this impact would remain significant and unavoidable. Impacts on Webb Tract

prehistoric resources and Bouldin Island historic-period resources can be reduced to a less-than-significant level through preparation of a historic properties management plan (HPMP) providing for treatment and monitoring of these resources, and preparation of a data recovery plan for resources on Bouldin Island. Disturbance of intact burials and buried resources on Holland Tract under Alternatives 1 and 2 could be avoided with design of habitat management and enhancement activities to prevent such disturbance and with preparation of an HPMP. Mitigation measures are available to recover or protect some of the Holland Tract cultural values that would be lost as a result of implementation of Alternative 3, but this impact would remain significant and unavoidable.

Implementation of the DW project alternatives would result in cumulative impacts on historic-period resources. Destruction of the resources on Bacon Island that may be eligible for NRHP listing as a historic district would add to the loss of this historic resource type in the Delta. This impact is considered significant and unavoidable. Effects of the DW project would not significantly contribute to the overall loss of prehistoric resources in the Delta and are considered to be less than significant.

Under the No-Project Alternative, damage to known and unknown prehistoric sites could result from continued agricultural activities on the DW islands. The adverse effects of continued agricultural activities on historic and prehistoric resources on the DW project islands is typical of the effects of land management in the region. Therefore, implementing the No-Project Alternative would contribute to cumulative effects on cultural resources in the Delta.

Land Use and Agriculture

Agriculture is the primary use of the DW project islands and would be affected by DW project implementation. Potential land use impacts of the DW project alternatives include displacement of residences and structures, conflicts with adjacent land uses, effects on Williamson Act contracts, inconsistency with local zoning and land use plans and policies, and inconsistency with general plan principles. Potential agriculture impacts include conversion of prime agricultural lands and conversion of substantial acreages of nonprime agricultural lands to nonagricultural uses.

Implementation of Alternative 1, 2, or 3 would result in two significant and unavoidable land use and agriculture impacts. Conversion of 6,300 acres of prime agricultural land on Webb and Holland Tracts to water storage and habitat, respectively, would be inconsistent with Contra Costa County agricultural principles to preserve prime agricultural lands for agricultural production and promote a competitive economy and would

therefore be a significant and unavoidable land use impact. Direct conversion of approximately 16,180 acres of agricultural land on the four DW project islands under Alternative 1 or 2, or of 20,345 acres under Alternative 3, including harvested cropland and pasture, short-term fallowed land, and long-term idled lands, is considered to be a significant and unavoidable agriculture impact. Implementation of Alternative 1, 2, or 3 would contribute to the significant and unavoidable cumulative impact of cumulative conversion of prime agricultural land in the Delta.

Implementing Alternative 1, 2, or 3 would result in the less-than-significant land use impact of displacement of residences and structures on reservoir islands. An additional less-than-significant impact, displacement of property owners on habitat islands, would result from implementation of Alternative 1 or 2.

Implementation of the No-Project Alternative would result in an increase in cultivated acreage and agricultural production on the DW islands. Under the No-Project Alternative, there would be no change in the status of onsite structures, Williamson Act contracts, consistency with zoning and general plan designations, or consistency with relevant general plan policies.

Recreation

The demand for recreation opportunities in the Delta is expected to increase, primarily as a result of growth of major population centers such as Sacramento, Stockton, Tracy, Pittsburg, and the Bay Area. The EIR/EIS discusses the changes in recreational hunting, fishing, and boating in the Delta that could result from implementing the DW project alternatives.

Hunting recreation use-days in the Delta would increase by approximately 21% with implementation of Alternative 1 or 2 or by approximately 13% with implementation of Alternative 3. All three alternatives would increase boating recreation use-days in the Delta by approximately 5%. All three alternatives also would increase recreation use-days for other recreational uses in the Delta. These impacts are considered beneficial. All three alternatives would also contribute to the beneficial cumulative impacts of an increase in recreation opportunities in the Delta and enhancement of waterfowl populations and increased hunter success in the Delta. Enhancement of waterfowl habitat on the DW habitat islands under Alternatives 1 and 2 could result in the less-than-significant impact of decreased hunter success outside the project area.

Implementation of Alternative 1, 2, or 3 would increase boat use in Delta channels and alter boating conditions (e.g., necessitate speed restrictions) on waterways adjacent to the DW project islands. These factors could detract from the quality of the recreation experience for boaters and anglers in the project vicinity. This impact is considered significant and unavoidable. However, if the project description were modified to reduce the

number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level. Issues related to waterway traffic and safety are described below under "Traffic".

Under the No-Project Alternative, an intensive for-fee hunting program would be operated on the DW project islands. This program would generate approximately 12,000 additional recreation use-days, resulting in a 17% increase over the existing hunting recreation use-days in the Delta. Implementation of the No-Project Alternative would also contribute to a cumulative increase in recreation opportunities in the Delta and enhancement of waterfowl populations and increased hunter success.

Visual Resources

Visual resource issues include potential changes in the visual quality of the DW project islands and potential conflicts with local visual resource policies and designations that would result from DW project implementation. Under Alternatives 1, 2, and 3, introducing pumps, siphons, and recreation facilities into the existing landscape; removing vegetation; and placing rock revetment on the interior sides of levees around the reservoir islands would result in a significant and unavoidable impact on the quality of views of Bacon Island and Webb Tract from adjacent waterways and from the Santa Fe rail line along the south side of Bacon Island. Under Alternative 3, these project features would also result in a significant and unavoidable impact on the quality of views of Bouldin Island and Holland Tract from adjacent waterways. Mitigation measures of partially screening pump and siphon stations and designing project features to blend with the surrounding environment would reduce these impacts, but not to a less-than-significant level. Under Alternative 1 or 2, the reduction in the quality of views of Bouldin Island and Holland Tract from adjacent waterways would be a significant impact, but implementing the mitigation measures listed above would reduce this impact to a less-than-significant level. No significant cumulative impacts on visual resources are expected to result from implementation of any DW project alternative.

The management of DW islands as wildlife habitat under Alternative 1 or 2 would enhance views of Bouldin Island from SR 12 and would increase the visual quality of views of island interiors and the DW project vicinity for recreationists using the DW project islands. These impacts are considered beneficial.

Implementation of Alternative 1, 2, or 3 could result also in a reduction of the visual quality of views of the Bacon Island and Webb Tract interiors from island levees and a potential conflict with the Bacon Island Road scenic designation. These impacts are considered less than significant. Additional less-than-significant impacts would result from implementation of

Alternative 3: the views south of SR 12 would be altered because of construction of a new levee parallel to the highway, and the quality of views of Holland Tract from the island levees would be reduced.

Views of the islands would not substantially change under the No-Project Alternative.

Utilities and Highways

Implementation of Alternative 1, 2, or 3 would result in significant impacts on electrical utilities and emergency services. Existing Pacific Gas and Electric Company (PG&E) overhead transmission lines would be inundated on reservoir islands during water storage operations and would need to be extended on Webb Tract, Bouldin Island, and Holland Tract to serve proposed siphon, pump, and recreation facilities. Operation of the recreation facilities on the DW project islands would increase demand for police and fire services on the DW project islands and in adjacent waterways. These impacts are considered significant. To mitigate impacts on electrical utilities to a less-than-significant level, DW, in coordination with PG&E, would permanently relocate the affected electrical transmission lines on reservoir islands to the improved perimeter levees during project construction and would extend the existing electrical transmission lines on the DW project islands to serve new facilities. DW would also incorporate adequate lighting, security services, and fire protection features into design and operation of the recreation facilities to reduce impacts on police and fire services. Also, under Alternative 3, fog hazard along SR 12 on Bouldin Island could increase and result in a significant and unavoidable impact on traffic safety; no mitigation is available to reduce this impact to a less-than-significant level. Implementing Alternative 1, 2, or 3 is not expected to result in any significant cumulative impacts.

Implementation of Alternative 1, 2, or 3 would result in less-than-significant impacts on PG&E gas lines on Bacon Island; ferry service operations to Webb Tract; and water supply, sewage, and solid waste facilities and services. Additionally, implementation of Alternative 3 would result in a less-than-significant impact on the structural integrity of SR 12.

Beneficial impacts on utilities and roadways are associated with improvement of existing levees under Alternative 1, 2, or 3. Utilities and county roads would benefit from levee improvements on the DW project islands, and electrical transmission lines and utility facilities on adjacent islands would benefit from the overall reduction in cumulative risk of levee failure in the area.

Implementation of the No-Project Alternative would increase the subsidence rate of DW project island soils and, consequently,

would increase the risk of failure of roads associated with DW island levees, maintenance requirements for gas lines on Bacon Island, and risk of structural failure and need for maintenance of transmission lines.

Traffic

The EIR/EIS assesses the impacts of the DW project alternatives on traffic congestion, traffic circulation and access, and safety on roads and waterways in the project area during construction and operation of the DW project alternatives. Impacts of the DW project alternatives on the physical roadway structure are assessed under "Utilities and Highways".

Implementation of Alternative 1, 2, or 3 would result in significant and unavoidable impacts on vehicle and boat traffic and congestion during project operation. The primary source of vehicle and boat traffic during project operation would be summer recreation use of the DW project facilities. However, if the project description were modified to reduce the number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level. Increased boat-traffic congestion would contribute to waterway safety problems in Delta channels. Clear posting of waterway intersections, speed zones, and potential boating hazard areas, as well as enforcement of boating regulations, would reduce potential safety problems near proposed recreation facilities to a less-than-significant level.

Project construction under Alternative 1, 2, or 3 could also result in the creation of significant safety conflicts on Delta roadways and waterways. The addition of construction vehicles to roadway traffic levels and the use of large barges in Delta waterways would affect vehicle and boat safety. Clearly marking roadway intersections with poor visibility in the DW project vicinity, marking and lighting barges at the DW project islands, and notifying the U.S. Coast Guard of construction activities would mitigate these construction-related impacts to less-than-significant levels.

Reducing agricultural vehicle traffic on Delta roadways during DW project operation would reduce safety conflicts between agricultural vehicles and other traffic. This is considered a beneficial impact of Alternatives 1, 2, and 3. Additionally, implementation of Alternative 1, 2, or 3 would result in less-than-significant impacts on peak-hour traffic and circulation during project construction and on waterway navigation conditions and traffic circulation during project operations.

In combination with future traffic increases from other sources, the increase in traffic generated by Alternative 1, 2, or 3 would contribute to a significant and unavoidable cumulative impact on traffic congestion on Delta roadways. Although

implementing California Department of Transportation's (Caltrans') route concepts for SR 4 and SR 12 would reduce this impact to a less-than-significant level, no funding sources have been identified by Caltrans to implement this measure. Increased safety problems on Delta waterways as a result of increasing recreation use, combined with recent funding cutbacks for marine patrol services in the Delta; would constitute a significant and unavoidable cumulative impact.

Under the No-Project Alternative, peak-hour traffic volumes would slightly increase because of increased agricultural production and recreational use. Agricultural vehicle traffic on Delta roadways would also increase, creating potential safety conflicts on roads in the DW project vicinity. Clearly marking intersections with poor visibility in the vicinity of agricultural operations would not be required, but could reduce this effect. Circulation on Delta roadways could be decreased by the addition of more slow-moving agricultural vehicles. Restricting agricultural vehicles from using Delta highways during peak hours would reduce this effect of the No-Project Alternative, but implementation of this measure would not be required.

Air Quality

The EIR/EIS discusses air quality on and near the DW project islands and analyzes the impacts on air quality conditions in project area air basins that could result from implementation of the DW project alternatives. The pollutants studied for this analysis are carbon monoxide (CO), ozone precursors (reactive organic gases [ROG] and oxides of nitrogen [NOx]), and particulate matter smaller than 10 microns in diameter (PM10).

Construction and operation under Alternative 1, 2, or 3 would result in significant increases in emissions of ROG and NOx, and construction under Alternative 1, 2, or 3 would result in significant increases in PM10. The following mitigation measures would reduce construction impacts, but not to less-than-significant levels: perform routine maintenance on construction equipment, require borrow sites to be chosen closest to fill locations, prohibit unnecessary idling of construction equipment engines, and implement construction practices that reduce generation of particulate matter. Recreation-generated vehicle and boat trips would be the primary source of air pollutant emissions during project operations. There are no mitigation measures to reduce these project operation impacts to a less-than-significant level. To partially reduce project operation impacts, DW should coordinate with the local air districts to implement measures that would reduce or offset the DW project air emissions. Because the feasibility and effectiveness of those measures are not known, these impacts are considered significant and unavoidable. However, if the project description were modified to reduce the number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level.

Implementation of Alternative 1, 2, or 3 would result in increases in CO emissions during project construction and operation. Because the project area is a CO attainment area under state and federal standards, these changes in CO generation are considered less than significant. However, mitigation measures are recommended for the construction period to reduce the quantity of CO generated.

Under DW project operation, the reduction in agriculture-related activities would result in a beneficial decrease in PM10 emissions.

Implementation of Alternative 1, 2, or 3 in conjunction with cumulative development and increased recreational use of the Delta would contribute to the cumulative production of ozone precursors (ROG and NOx) and CO in the Delta. This cumulative impact is considered significant and unavoidable.

Operation of the No-Project Alternative includes intensified agricultural activity with some increase in recreational uses. Implementation of the No-Project Alternative would result in increases in CO, ROG, NOx, and PM10 emissions.

Economic Conditions and Effects

The following types of economic effects could be associated with implementation of the DW project alternatives:

- changes in employment and income resulting from changes in agricultural and recreational uses of the DW project islands;
- changes in employment and income resulting from construction, operation, and maintenance activities associated with project implementation; and
- changes in fiscal conditions (public revenues and public costs) resulting from project implementation.

Because economic effects are not considered environmental impacts under CEQA and NEPA, no conclusions are made in the EIR/EIS regarding the significance of these economic effects and no mitigation for economic effects is identified.

Under Alternative 1 or 2, the conversion of lands currently farmed on the DW islands would result in adverse effects on agriculture-related employment and income; however, project-related recreation expenditures and project construction, operation, and maintenance activities would generate a net increase in employment and income within the two-county region. The construction and operation of the project also would generate additional property tax revenues within Contra Costa and San Joaquin Counties.

Implementing Alternative 3 would have a beneficial effect on the regional economy at buildout of the project. Net employment and income benefits would be greater than those described for Alternatives 1 and 2 because of increased construction, operation, and maintenance employment and expenditures required to expand water storage capabilities to all four DW islands.

Implementing the No-Project Alternative would result in increases in local employment and income in the agricultural sector. However, these effects may be short term because of erosion and subsidence problems associated with agricultural production on the islands. No information is available concerning the length of time agriculture will remain physically and economically feasible on the project islands; however, intensified agricultural use of the islands likely will become more costly to maintain over the long term. Recreation on the project islands would increase from existing levels under this alternative because for-fee hunting (day use only) on the four islands would be expanded, which would benefit local economies.

RESPONSE TO PUBLIC COMMENTS AND ISSUANCE OF THE FINAL EIR/EIS

Once all comments have been assembled and reviewed, the Corps and SWRCB will prepare responses on all notable environmental issues that have been raised. These responses to comments, combined with the draft EIR/EIS and revisions to the draft EIR/EIS, will constitute the final EIR/EIS.

After water right hearings are held, SWRCB and the Corps will circulate the final EIR/EIS for public review. The final EIR/EIS is anticipated to be released early in 1996.

DELTA WETLANDS

E I R / E I S



State Water Resources Control Board
Division of Water Rights



U. S. Army Corps of Engineers
Sacramento District



Jones & Stokes Associates, Inc.